EPA420-R-05-xxx
June 2005

Test Procedures for Highway and Nonroad Engines and Omnibus Technical Amendments

Technical Support Document and Summary and Analysis of Comments

Assessment and Standards Division
Office of Transportation and Air Quality
U.S. Environmental Protection Agency

Table of Contents

Chapter 1: Highway engines and vehicles (40 CFR parts 85 and 86)

I. Summary and Analysis of Comments

We received comments on many of the proposed provisions in parts 85 and 86, with additional comments raising new issues for us to consider. The following discussion presents a summary and analysis of all these comments. Section II discusses the changes included in the proposal.

Issue	Response
86.095-35: Volvo commented that we should allow branding for heavy-duty highway engines	We agree that the proposed provisions to allow another company's trademark on the engine label is also appropriate for heavy-duty highway engines.
85.1511: The Engine Manufacturers Association (EMA) recommended changing the repair exemption to align with the similar provisions for locomotive and marine diesel engines. This would generally allow engine operation as needed for transportation to facilitate repairs.	We are concerned that allowing noncompliant heavy-duty vehicles to drive to repair facilities in the United States would be much harder to monitor than the comparable provisions for locomotive or marine diesel engines. We are therefore not adopting these provisions at this time. We may in the future consider what additional requirements would be necessary to allow this type of operation without opening a loophole that would allow unanticipated use of this exemption to circumvent the regulations.
85.1713: Cummins and EMA responded to our request for comment related to a provision that would allow engine manufacturers to ship certified engines without applicable aftertreatment components, while providing for separate shipment of those components to equipment manufacturers. The manufacturers commented that such a provision should be set up to require either that the component cost be included in the price of the engine, or auditing requirements for engine manufacturers, but not both, since the equipment manufacturer has enough incentive to make the final installation without additional oversight. They also objected to the need to apply a temporary label, since it would add a burden that provides no added value.	The preamble addresses the principal aspects of this comment. Regarding the temporary label, we believe that it would add an incremental improvement in preventing problems, primarily related to the possibility of a vehicle manufacturer inadvertently treating the engine as not requiring some specific aftertreatment component. We believe, however, that the requirement for engine manufacturers to receive confirmation that the vehicle manufacturer has ordered the aftertreatment component to adequately address this concern.
86.007-11: EMA commented that the flexibility of meeting the phase-in requirements for heavy-duty diesel engines based on either model year or calendar year should also apply to phase-out engines.	We intended for the proposed change to address this situation and have modified the regulatory language to make this clearer.
86.007-21: EMA noted that paragraph (o)(5) requiring submission of PM data was redundant, since paragraph (o)(1) already requires submission of data for all pollutants.	We agree with this comment and are removing the redundant paragraph.

85.1713: Caterpillar commented that we should allow them to complete their engine assembly at different facilities, including some steps performed by another company under contract.	We have added a new provision allowing manufacturers to assemble engines in different locations, provided that they maintain control of the engines at all times, and inform us that they are using this exemption. We may require that manufacturers take certain steps to ensure that engines end up in their certified configuration.
86.1305: EMA commented that part 1065 already provides for the use of partial-flow sampling systems for transient PM measurements in the laboratory only after an equivalence demonstration, and that the standard-setting part should not impose any further restriction.	We agree with this comment and have taken out the specific reference to partial-flow sampling in §86.1305.
86.1301: EMA requested that we not require migration to the test procedures until 2010. This would minimize disruption in the transition, since manufacturers will start meeting the long-term standards in that year.	We agree that delaying mandatory testing under part 1065 until 2010 is appropriate. We have added clarifying language related to EPA testing in the transition period. We intend to upgrade to the more accurate test procedures for any confirmatory testing. For some provisions in part 1065, however, this would not be appropriate if manufacturers have not yet based their testing on the part 1065 procedures. We now specify that our testing will use the manufacturer's selected procedures for mapping engines, generating duty cycles, and applying cycle-validation criteria. For any other parameters, EPA may conduct testing using either of the specified procedures.
86.1301: Similarly, Cummins and EMA requested that we initiate the migration to the new test procedures starting with the 2004 model year. In later comments, EMA requested that we delay the start of the new test procedures until the 2005 model year, but added no explanation to describe the changed recommendation.	Manufacturers have already certified their 2004 and 2005 model year products, so selecting the starting point for the new test procedures has no bearing on the certification process for either of these model years. We are therefore staying with the manufacturers' initial suggestion of the 2004 model year for the most straightforward presentation in the regulations, since new emission standards also started in 2004.
86.1362 and 1363: EMA also requested that EPA allow the use of the original discrete-mode test cycle and procedures from 2007-2009, rather than changing immediately to ramped-modal testing in 2007, without allowing the original test procedures as an option. EMA said that some of its members had already made decisions for those model years based on the original test procedures.	We agree with the comment and will allow the discrete-mode test cycle and procedures for model years 2007 through 2009.
86.1305: The incorrect reference to §86.1358-2007 should be removed.	We agree with this comment and have made the appropriate change to the regulations.
86.007-35, EMA pointed out that the model year for heavy-duty engines may not match the model year of the vehicle if the engines are installed in light-duty trucks. The labeling requirements should reflect this to avoid an anomalous requirement to identify the applicable fuel as low-sulfur diesel, where the label should say ultra low-sulfur diesel.	We agree with this comment and have made the appropriate change to the regulations.

86.1807-07 and 86.1808-07: Similarly, manufacturers pointed out that the maintenance instructions and labeling requirements for light-duty vehicles need to be updated to reflect the timing of our requirements to introduce ultra low-sulfur fuel for gasoline vehicles.	We agree with this comment and have made the appropriate change to the regulations.
86.884: Manufacturers requested that we remove the minimum specification for the placement of smokemeters, which is currently specified as 10-32 feet downstream of the exhaust manifold (or other engine hardware).	We agree that smokemeters can accurately measure smoke emissions closer than 10 feet downstream of engine components. We are changing the regulation to specify only a maximum distance of 32 feet. This change should have no effect on the stringency of applicable smoke standards.
86.413: The Motorcycle Industry Council pointed out that the label for highway motorcycles should identify emission rates in g/km, not g/mile.	We agree that the label should identify the appropriate units as g/km.
86.410: The Motorcycle Industry Council commented that the two-year delay in permeation standards for small-volume manufacturers of highway motorcycles was not in the regulations, even though this was clearly described in the preamble to that final rule.	We inadvertently adopted the standards for highway motorcycles without this provision. The final rule includes this provision in §68.410-2006.

In addition to these comments, we have identified a variety of additional minor changes and adjustments to include in the final rule. There are a variety of changes simply to correct typographical and nomenclature errors. In addition, these changes include:

- Cleaning up the provisions of §§86.447 and 86.448. We revised the language in several places to more clearly address the situation for motorcycle manufacturers installing engines certified to other programs.
- Correcting units in §86.1816 to reflect the appropriate requirements for testing heavy-duty vehicles.
- Adding 86.1333-2010 to the list of sections in part 86, subpart N, that continue to apply after 2010. This section describes the applicable duty cycles for heavy-duty engines.
- Adding a reference in §86.1370-2007 to point to §86.1301. This clarifies the applicability of the procedures in part 86 and part 1065 to Not-To-Exceed testing and field testing.

II. Summary of Rulemaking Changes

The following discussion describes what we proposed to change for light-duty vehicles, highway motorcycles, and heavy-duty highway engines, with adjustments as noted above in response to public comments.

1. Light-duty Vehicles

a. Calculation Method for Nonmethane Hydrocarbons

We are revising regulatory provisions to properly align EPA and CARB calculation methods for measuring nonmethane hydrocarbons from gasoline, diesel, methanol, ethanol, and liquefied petroleum gas fueled light-duty vehicles. Harmonization of EPA and CARB testing and calculation practices, including proper accounting for the methane response of the total hydrocarbon FID, was anticipated when Tier 2 regulations were developed. Modifying the language in 86.121-90(d) and 86.144-94(c)(8)(vi) to explicitly require the use of a measured methane response factor, as opposed to the current CFR text which specifies an assumed methane response factor of 1.0, will align the calculation methods. Calculating nonmethane hydrocarbon using a measured methane response factor is the technically correct calculation and measurement method.

b. Correction to Tier 2 Regulations

On December 6, 2002, we made some minor technical amendments to EPA's Tier 2/Gasoline Sulfur regulations (67 FR 72821, December 6, 2002). However, those actions mistakenly reversed a prior correction to Table S04-2 in § 86.1811-04(c)(6) that was made on February 28, 2000 (65 FR 10598, February 28, 2000). We are now reestablishing the correct version of that table. Specifically, in § 86.1811-04(c)(6), in Table S04-2, the "Notes" entry corresponding with "Bin No. 9"' should read "a b e f g h".

c. Correction to Supplemental Federal Test Procedure Regulations

We are making the following corrections to regulatory references, spelling, and the like with these technical amendments:

- An incorrect regulatory reference is corrected in §86.158-00;
- Revision to section 86.161-00 inserts the correct humidity tolerance of plus-or-minus 5 grains of water/pound of dry air; and
- Revision to the equation in section 86.164-00 adds plus ("+") signs that were omitted in the regulations.

d. Correction to National Low Emission Vehicle Regulations

In several places in the National Low Emission Vehicle (NLEV) emissions standards there are typographical errors affecting emission standards and testing provisions which require correction:

- Incorrect in-use formaldehyde standards for light-duty vehicles in tables R99-5 and R99-6 (§ 86.1708-99).
- Incorrect model year applicability of in-use standards for light-duty trucks (§ 86.1709-99(c)(1)).
- Missing standards for light-duty trucks from 0-3750 loaded vehicle weight in Table R99-14.2 (§ 86.1709-99).
- Correction of fleet average NMOG standards for calculating credits for 1997 and 1998 model years in the Northeast Trading Region (§ 86.1710-99(c)(8)).
- Correcting a reference to 86.1705-99(e)(4) that should have been to 86.1707-99(d)(4) (§ 86.1711-99).

e. Revisions and corrections to dynamometer driving schedules.

i. SC03 and US06 driving cycles

This rule corrects errors in the SC03 driving cycle and to reconcile several discrepancies between the CFR language and the second-by-second US06 and SC03 drive cycle traces in the appendices to part 86.

We are revising the SC03 cycle in Appendix I, paragraph (h) so it is lengthened to 600 seconds by adding six seconds of zero miles per hour after 594 seconds. This change and additional language changes eliminates confusion in how to execute the requirements in sections 86.160-00(c)(12) and 86.159-00(f)(2)(ix). Sections 86.159-00(f)(2)(ix) and 86.160-00(c)(12) both state that the engine is turned off 2 seconds after the end of the deceleration (which occurs at 594 seconds and driving stops at 596 seconds.)

With respect to the SC03 drive trace, section 86.160-00(c)(10) reads “Twenty seconds after the engine starts, begin the initial vehicle acceleration of the driving schedule.” However, this is incorrect. The printed driving schedule in Appendix I, paragraph (h), correctly shows eighteen seconds of idle. The regulatory language is modified to reflect eighteen seconds of idle, rather than twenty.

Section 86.160-00(c)(12) currently reads “Turn the engine off 2 seconds after the end of the last deceleration,” but the Appendix I, paragraph (h), drive schedule has no idle seconds at the end of the SC03 cycle. Idle speed values are added to the end of the SC03 drive schedule to make it consistent with the regulatory language. This clarifies that the first non-zero speed value to be at trace time t=19 seconds. This section is amended to clarify that driving stops at trace time t=596 seconds.

The US06 drive schedule has a similar discrepancy. Section 86.159-00(f)(2)(ix) reads "Turn the engine off 2 seconds after the end of the last deceleration." However, the drive schedule in Appendix I (g) has six idle seconds at the end of the US06 cycle. We are amending this section to clarify that driving stops at trace time t=596 seconds.

ii. Urban Dynamometer Driving Schedule

We are also taking action to correct two minor errors in the Appendix I, paragraph (a), Urban Dynamometer Driving Schedule (UDDS) that have existed since the 1970’s. Originally published in the Federal Register on November 10, 1970 (35 FR 17311), the UDDS is the driving cycle that is the basis of the Federal Test Procedure. Since it was published, however, two speed values in the UDDS were erroneously modified. Specifically, the speed value at t=961 seconds was changed from 5.3 mph to 5.0 mph in 1972, and the speed value at t=1345 seconds was changed from 18.3 mph to 18.8 sometime between 1973 and 1977. The speed value of 5.0 mph at t=961 creates an acceleration of 3.6 mph/sec to 8.6 mph at t=962, which is inconsistent with the

acknowledged 3.3 mph/sec maximum acceleration rate due to dynamometer limitations. The speed value of 18.8 mph at t=1345 is inconsistent with what should be a gradually decreasing acceleration rate from t=1343 to t=1347 seconds. This rule reverts these values back to the speed values as they were published in 1970. It is important to note that the regulated industry and EPA have been using the correct speed values since 1970, despite the error in the Code of Federal Regulations (CFR).

In addition, a dynamometer manufacturer commented to EPA that the CFR has several errors in the Appendix I, paragraph (b), version of the UDDS that is expressed in kilometers per hour. EPA has verified that these errors are not rounding errors when converting from miles per hour, but are more likely the result of errors in typing. The table below indicates the correct mile per hour and kilometer per hour values, as well as the incorrect value. This final rule makes these corrections.

Time (seconds)	Incorrect KPH	Correct KPH	Correct MPH
363	52.3	52.8	32.8
405	14.5	14.8	9.2
453	31	31.9	19.8
491	55.8	55.5	34.5
577	21.4	27.4	17.0
662	43.9	42.0	26.1
663	43.1	42.2	26.2
664	42.3	42.2	26.2
932	40.3	40.2	25.0

2. Highway Motorcycles

a. Highway Motorcycle Labeling Requirements

On January 15, 2004, we finalized new emission standards for highway motorcycles (69 FR 2398, January 15, 2004). These new standards are implemented in two stages: a “Tier 1” that is effective in the 2006 through 2009 model years, and a “Tier 2” that takes effect starting with the 2010 model year. These standards are generally harmonized with California emission standards that take effect two years earlier. Under the new standards, Class III motorcycles must comply with a new HC+NOx emission standard on a corporate average basis. This new flexibility allows manufacturers to market motorcycles that produce more pollution than the designated average standard as long as they are balanced out by sales of less-polluting models such that the manufacturers’ sales-weighted corporate average remains below the standard. Averaging is also optionally allowed for Class I and II motorcycles.

Since publishing the final rule, however, we realized that the labeling language for highway motorcycles is not helpful in the context of the new averaging standard. The current federal labeling language (see 40 CFR 86.413-78) only requires that a motorcycle label indicate compliance with EPA standards for a given model year. This is all that is needed when there is no uncertainty regarding what the applicable emission standards are. In the context of the type of averaging program we finalized, however, the manufacturers essentially choose their own emission standard (up to a cap) for each engine family. The manufacturer-selected emission standard is known as a "Family Emission Limit," or FEL. For example, a manufacturer with two engine families might market one meeting a standard of 2.2 grams/mile HC+NOx and another one meeting a standard of 0.5 grams/mile HC+NOx. If these are equally-selling engine families, then the manufacturer will meet the required Tier 1 average of 1.4 grams/mile HC+NOx.

In the case described above, a label showing only the model year will not provide adequate information regarding the applicable emission standard. Historically both EPA and ARB have required labels that identify the specific applicable FEL for vehicles certified under averaging programs. Therefore, we are amending the labeling requirements with two goals in mind. First, the label must provide sufficient information regarding the applicable emission standard and model year, as well as specific tune-up information. Second, the label requirements should be aligned with ARB to the greatest degree possible to prevent a situation where the manufacturer has to apply two labels to a motorcycle to meet two different sets of requirements. The new labeling language in 40 CFR 86.413-2006 accomplishes both of these goals.

b. Highway Motorcycle Fuel Specifications

In our final rule setting new emission standards for highway motorcycles (69 FR 2398, January 15, 2004) we updated the fuel specifications for motorcycle emission testing to be consistent with the fuel specifications finalized on February 10, 2000, as part of our "Tier 2 Motor Vehicle Emissions Standards and Gasoline Sulfur Control Requirements" (65 FR 6697, February 10, 2000). This was necessary to ensure that motorcycles are tested using fuels consistent with those available in the marketplace. We received no negative comments on making this change. It is necessary at this time to correct some errors that were made in updating the motorcycle test fuel specification. The specific corrections are:

- Changing the volume percent of aromatics from "35 minimum" to "35 maximum";
- Changing the phosphorous g/liter specification from 0.005 g/liter to 0.0013 g/liter (the alternative specification is 0.005 g/U.S. gallon);
- Changing the sulfur weight percent from 0.08 maximum to 0.008 maximum; and
- Changing the volatility test procedure from "ASTM D 3231" to "ASTM D 323."

c. Highway Motorcycles with engines below 50 cc

We are adopting modified language in §86.447 and §86.448 to clarify various aspects of the provision allowing manufacturers to use products certified to nonroad emission standards instead of the standards for highway motorcycles under part 86. These changes include the following:

- Clarify the requirement related to the number of engines that may be certified under nonroad programs.
- Define the requirements related to generating and using emission credits with these engines.
- Add language to better define the legal responsibilities for companies involved in producing motorcycles under this provision.

3. Heavy-duty highway engines

a. Miscellaneous changes

We are adopting the lab-testing and field-testing specifications in part 1065 for heavy-duty highway engines, including both diesel and Otto-cycle engines. These procedures replace those currently published in 40 CFR part 86, subpart N. We are making this transition over several model years to fully migrate to part 1065, no later than model year 2010. Manufacturers do not need to conduct new testing if they are able to use carryover data, but any new testing for 2010 and later model years must be done using the part 1065 procedures. Migrating heavy-duty highway engines to the part 1065 procedures allows us to include all the testing-related improvements in the HD2007 rule, including those we have adopted through guidance.[1] In addition, part 1065 incorporates revisions based on updated procedures for sampling low concentrations of PM.

We are also clarifying that certain data requirements related to Supplemental Emission Testing are required only when engines are subject to Maximum Allowable Emission Limits.

We are making a minor adjustment to the phase-in process for the HD2007 standards to allow manufacturers to make their compliance demonstration either on the basis of model years or calendar years. This increases the flexibility for manufacturers to define their model year without affecting their ability to show that they meet their phase-in obligations. Because the phase-in period is three years under either approach, we believe this adjustment does not harm the environmental objectives of the program.

b. Ramped-modal testing

Manufacturers must meet emission standards using a Supplemental Emission Test (SET) starting in 2007. The SET measures emissions during 13 separate steady-state modes of engine operation. For the laboratory-based SET specified in §86.1360-2007, we are adopting a requirement for the 13-mode test cycle to be run using a Ramped-Modal Cycle (RMC), which is discussed below. Manufacturers may switch to using RMC starting with the 2007 model year,

[1] "Guidance Regarding Test Procedures for Heavy-Duty On-Highway and Non-Road Engines, " December 3, 2002.

with full use of the RMC required starting with the 2010 model year. The timing of the implementation of the RMC is paired with the overall migration of test procedures to part 1065.

An RMC operates at the same engine speeds and loads as in conventional discrete-mode testing, but the modes are connected by gradual ramps in engine speed and/or torque for a single, continuous emission-sampling period. For the RMC we are adopting for the SET, the steady-state modes are connected with twenty-second linear speed transitions and linear torque transitions, which is consistent with the transition time currently allowed in §86.1360-2007. The difference is that these transitions are sampled as part of the SET. That is, emission sampling starts at the beginning of an RMC and does not stop until its last mode is completed.

The RMC for the SET involves a different sequence of modes than is currently specified in §86.1360-2007. For example, the first mode, which is engine idle, is split so that half the idle mode occurs at the beginning of the test and half occurs at the end of the test. This helps facilitate certain technical aspects of emission sampling. Instead of using weighting factors for each steady-state mode, an RMC specifies different time durations for each mode. Time durations of the modes and transitions are proportioned to the established modal weighting factors in §86.1360-2007. The information needed to run the SET as an RMC is given in the table below.

There are several advantages to running the SET as an RMC. First, we anticipate that manufacturers will use aftertreatment systems with discrete regeneration events to meet the emission standards for 2007 and later model year heavy-duty diesel engines (January 18, 2001, 66 FR 5002). Under the current procedure for conducting an SET in §86.1360-2007, manufacturers sample emissions for an unspecified time duration near the end of each of thirteen individual two-minute modes (except idle, which is four minutes). The result is thirteen separate measurements that must be combined mathematically to yield an overall emission result in g/hp-hr. Because discrete aftertreatment regeneration events typically cause short but large increases in emissions, the current procedure in §86.1360-2007 may not be repeatable—a regeneration event may or may not be sampled in a given mode. For sampling low concentrations of PM, this effect is exaggerated because sample times per mode may be as short as twenty seconds. Furthermore, without specific start and stop times for sampling each mode, an anticipated regeneration event may be intentionally or unintentionally included or excluded. With an RMC, this variability is removed by requiring emissions sampling for the entire forty-minute cycle.

The RMC involves one emission measurement rather than 13 separate measurements for each mode. The more frequent, separate measurements can cause inaccuracy, especially at low emission levels, since dead volumes in the sampling system and delayed sampling can cause the system to assign one mode's emissions to a different mode. The RMC avoids this by collecting the total emissions into a single sample and dividing by the total work done over the test period. A single measurement also substantially reduces the resource burden to conduct testing.

The RMC enables the use of batch sampling systems such as bag samplers. This is an advantage at low emissions, because these sampling systems are capable of quantifying lower levels than continuous sampling systems.

The longer sampling period for RMC testing also increases the total collected mass of pollutants. This is especially significant because the heavy-duty highway diesel PM standard, effective in 2007, approaches current PM microbalance quantification limits. Sampling for 40 minutes over the RMC increases the total collected PM by 500 percent compared with the conventional discrete-mode procedure.

4. Importation of nonconforming highway engines and vehicles.

The Agency is adopting revisions to 40 CFR part 85, subpart P regarding the applicable emission standards for imported nonconforming highway vehicles and engines, including light-duty vehicles (passenger cars), light-duty trucks, heavy-duty vehicles, heavy-duty engines, and motorcycles. This change clarifies that these nonconforming vehicles and engines are required to meet the emission standards in effect when the vehicle or engine was originally produced, not the emission standards in effect when the vehicle or engine is modified. This approach is consistent with the requirements for light-duty Independent Commercial Importers (ICIs) which have been in effect since 1996 (61 FR 5842, February 14, 1996).

Most of the issues related to this final rule were previously addressed in the 1996 rule. An excerpt from that 1996 rule provides the a brief summary of the basis for this final rule. Section I.A of the 1996 final rule reads in part:

> As proposed, EPA is eliminating the requirement that nonconforming light-duty vehicles and Light-duty trucks imported pursuant to 40 CFR 85.1501 or 85.1509 meet the part 86 emission standards in effect at the time of modification. These vehicles, with a few exceptions, will instead be required to meet emission standards (with applicable deterioration factors applied) that were in effect at the time of original vehicle production, using currently applicable testing procedures.
>
> The specific standards applicable to these vehicles are contained in a new §85.1515....
>
> As discussed in the proposal (Supplementary Document pp. 27-28, Docket No. A-89-20), when EPA promulgated the prior requirement to meet standards applicable at the time of modification, the Agency had no data or evidence suggesting that older vehicles could not be modified to meet current year emission standards. Since that rulemaking, EPA has obtained evidence suggesting that many older vehicles cannot be modified to meet current year standards without extraordinary cost, which makes the conversion financially unfeasible for many owners of such vehicles. Today's rule would give owners of older vehicles a way to import their vehicles. In addition, it would have been significantly more difficult and costly for importers to modify vehicles to comply with the current model year standards beginning in January, 1996, when the standards applicable to small volume manufacturers became substantially more stringent. EPA agrees with the statements submitted by ICIs after the close of the comment period that the expense of such modifications would have a serious deleterious effect on their businesses and would not justify the costs.

Although the intent of the 1996 rule was clear, we are adopting regulation changes to make the regulation language consistent with the intent of the 1996 rule. The 1996 final rule added 40 CFR

85.1515, which provided a list of the emission standards applicable to imported light-duty vehicles and light-duty trucks based on the original production (OP) year of the vehicle. Tables 1 and 2 in 40 CFR 85.1515 correctly indicate that the emission standards applicable for pre-1994 imported light-duty vehicles and light-duty trucks are based on the original production year of the vehicle. Tables 1 and 2 also correctly indicate (in a footnote) that 1994 and later imported light-duty vehicles and light-duty trucks are required to meet the applicable emission standards as "Specified in 40 CFR part 86 for the OP year of the vehicle, per 85.1515(c)." However §85.1515(c)(1) incorrectly indicates that "Nonconforming motor vehicles or motor vehicle engines of 1994 OP model year and later conditionally imported pursuant to §85.1505 or §85.1509 shall meet all of the emission standards specified in 40 CFR part 86 for the model year in which the motor vehicle or motor vehicle engine is modified." (emphasis added)

This ambiguity in the regulations was unfortunately not corrected after the 1996 rule changes became effective. Nor was it corrected when Interim non-Tier 2 and Tier 2 requirements were adopted for import vehicles (65 FR 6698, February 10, 2000). Although the 2000 rulemaking did not intend to change the highway engine or vehicle importation process, the regulations continued to indicate that nonconforming motor vehicles and motor vehicle engines must meet the emission standards in the model year in which the motor vehicle or motor vehicle engine is modified; see 40 CFR 85.1515(c)(2)(ii) through (d). We have now received several petitions from light duty ICIs to correct the regulations to permit vehicles imported by ICIs to meet OP year standards.

In summary, for the reasons discussed in the provisions of 61 FR 5842, February 14, 1996, we are adopting changes to correct the regulations for nonconforming highway vehicles so they are consistent with the intent of the 1996 final rule. This final rule will require imported highway vehicles to meet the emission standards in effect the year the vehicle was originally produced, not the emission standards in effect in the year the vehicle or engine is modified. We are, however, concerned that ICI provisions which apply OP year standards could be used as a way to circumvent our Tier 2 light duty standards and our new more stringent motorcycle standards. Thus we are capping each ICI's annual production of vehicles meeting OP year standards when OP year standards are less stringent than the standards that apply during the year of modification. We are adopting a cap of a total of 50 light duty vehicles and trucks and 50 motorcycles. This does not impact the number of vehicles an ICI may produce that are certified to the standards that apply during the year of modification.

While we have never had an ICI for highway HDEs, we are clarifying that the applicable standards for HDEs imported by an ICI are also those of the year of original production. For HDEs, we are adopting an annual cap of five on an ICI's production of engines certified to OP year standards that are less stringent than those that apply during the year of modification. This will address the possibility that ICIs could provide an avenue by which truck purchasers could avoid the additional costs of new trucks with engines meeting aftertreatment-based engine standards. We are adopting a similar amendment for nonroad diesel engines, as described elsewhere in this document.

We believe it is appropriate to have different caps on the quantity of vehicles and engines that can be certified to OP year standards, where OP year standards are less stringent than those that apply during the year of modification. The sales of light-duty vehicles and trucks are many times greater

than those of heavy-duty highway engines and nonroad diesel engines combined. Further, we believe that the caps for light-duty vehicles light-duty trucks, and motorcycles should be larger than those for nonroad and highway engines to accommodate an industry that has grown up around the light-duty ICI program. The light-duty and motorcycle ICIs can provide additional consumer choice and also provide an avenue by which (for a price) someone who has lived outside of the United States, including returning U.S. military personnel, can bring a used personal vehicle they acquired overseas into conformity with U.S. emission requirements. No such ICI industry exists for highway or nonroad engines. Where OP year standards are applied to highway and nonroad engines, we are adopting a lower cap. We believe it will be appropriate to limit the activities of engine ICIs, when previous model year engines are involved, to those specialized trucks or pieces of equipment for which demand is so low that normal certification didn't occur or might not occur. While we want to provide an opportunity for the importation of highly specialized vehicles or equipment that might otherwise be unavailable in the United States, we do not want to develop an industry that simply provides older equipment that will most likely be built with engines meeting significantly less stringent standards.

III. Maximum test speed

In the proposal, we requested comment on an issue related to defining maximum test speed for heavy-duty highway engines. Because maximum test speed in part 1065 differs from rated speed in part 86, we were considering a change to adjust how maximum test speed is applied to heavy-duty highway diesel engines. These speeds are used to transform normalized speeds into reference speeds for emission testing. Specifically, we requested comment on whether or not we should specify that maximum test speed should be equal to the 112 % speed from the duty cycle for this particular sequence. As explained below, we have determined that is appropriate to set the 112 % speed from the duty cycle equal to the maximum test speed specified in part 1065, and have added a new section to do this in §86.1333-2010.

For heavy-duty highway diesel engines, we require emission testing over the sequence speeds and torques in 40 CFR part 86, Appendix I, paragraph (f)(2), where rated speed has been represented by 100 % speed (40 CFR 86.1333-90(g)) and the maximum engine speed that occurs over the test cycle is 112 % of rated speed. Part 1065 bases the denormalized duty cycles on "maximum test speed," which is intended to roughly represent the highest non-idle speed at which the engine operates in use, without regard to maximum engine power.

Rated speed is generally declared by the manufacturer and must be at least as high as the lowest speed at which an engine generates 98 % maximum power. As stated in 40 CFR 86.1333-90(g), "[Rated speed] is generally intended to represent the rpm at which maximum brake horsepower occurs." In contrast, maximum test speed in part 1065 is the speed that lies farthest from the zero-speed, zero-power point on an engine power map that is normalized to 100 % power and 100 % speed at that power. For engines with low torque-rise, maximum test speed is at maximum power. So for these engines, there is little difference between maximum test speed and rated speed. (Note that torque-rise means an increase in maximum torque from maximum power to maximum torque.) We have observed, however, that all modern heavy-duty highway diesel engines have high torque-

rise, which causes maximum test speed to be (15 to 35) % higher than rated speed. For these engines, denormalizing the duty cycle based on maximum test speed is necessary in order to test these engines over their complete operating ranges.

The regulations being adopted (§86.1333-2010) specify that heavy-duty highway engine manufacturers determine the maximum test speed as described in Part 1065 and set this speed equal to the highest speed in the highway transient cycle, which is the 112 % speed. All other speeds will be normalized relative to this speed:

$$Actualrpm = \frac{\%rpm \cdot \left(MaxTestSpeed - CurbIdleSpeed\right)}{112} + CurbIdleSpeed$$

Note that the new §86.1333-2010 is shorter than the older §86.1333-90. Many of the provisions in the old §86.1333-90, such as those related to mapping the engine, idle speed enhancements devices, and transmissions are no longer necessary since they are now addressed in part 1065.

Chapter 2: Land-based nonroad diesel engines (40 CFR parts 89 and 1039)

I. Summary and Analysis of Comments

We received comments on many of the proposed provisions, with additional comments raising new issues for us to consider. The following discussion presents a summary and analysis of all these comments. Section II identifies the changes included in the proposal, with a brief rationale for each of those changes.

Issue	Response
89.1–Applicability: EMA pointed out that the regulations in part 89 don't have a provision corresponding to §1048.620 to allow certain Large SI engines to certify to the standards in part 89.	We agree with this comment and have changed the regulations accordingly.
89.2–Definitions: EMA stated a presumption that non-integrated auxiliary engines would be considered land-based engines subject to the emission standards in 40 CFR part 89.	We agree with this position, as described in Chapter 3. The definition of "marine engine," as proposed and as adopted, is consistent with this position.
89.130–Rebuilding: EMA noted that the rebuilding requirements currently do not apply to Tier 1 engines over 130 kW.	We agree with the comment, except that the current requirements do not apply to Tier 1 engines at or above 37 kW. The regulations have been modified accordingly.
89.114: Southwest Research Institute and EMA requested clarification that updating the test-procedure references from part 86 to part 1065 aren't intended to require lab upgrades.	The references introduced in part 89 are intended only to facilitate the migration of specified test procedures for heavy-duty highway engines from part 86, subpart N, to part 1065. Most of these references point to background information or optional systems. There is no intent to require new equipment or revised procedures as a result of these changed references. To ensure that this is the case, we are adding a provisions stating that any of the references to part 1065 may be taken from part 86 as a pre-approved alternative procedure.
89.611: EMA recommended changing the exemption allowing an owner to import a nonroad engine solely for the purpose of repair or alteration. The change would align with the similar provisions for locomotive and marine diesel engines. This would generally allow engine operation for such engines as needed for transportation to facilitate repairs.	Nonroad equipment generally does not need to travel under its own power for long distances to arrive at a repair facility. However, we agree that the equipment may need to be operated, for example, to drive up onto a trailer. We don't believe expanding the exemption will lead companies to improperly use engines under this provision, and have changed the regulation accordingly.
89.913–Engine dressing: EMA generally supports the expanded provision allowing manufacturers to use certified highway engines in nonroad applications without certifying them separately to nonroad emission standards. However, EMA believes a supplemental label should not be required.	We are finalizing these provisions as proposed. As we have concluded in other programs with the engine-dressing provisions, we believe it is important for engines that are modified and used in other applications to have a label identifying the company that made the conversion. The label also identifies the proper certification status of the engine for marine installations.

89.1003–Replacement engines: EMA objects to the change that would require different labels for replacement engines that must meet standards that applied at the time the replaced engine was built, since they would need to make separate labels for each power rating.	We are specifying label language for uncontrolled engines that is identical to the current regulation, which will prevent the need to revise labels that may already be designed and printed. For replacing certified engines, we believe it is important for the label to identify the fact that the replacement engine is subject to certain emission-control requirements, and are therefore specifying the same label language as we specify in part 1068 for this situation, which we have modified to address EMA's concerns (see Chapter 9). Separate labels are not needed for each power rating.
89.1009–branding: EMA supports the change to allow branding for Tier 2 and Tier 3 engines, but suggested using a reference to 40 CFR 1039.640 instead of repeating regulatory text.	We agree with the comment and have amended the regulation in §89.1009 accordingly.
89.1009–branding: Volvo requested that we clarify that the required contractual agreement include a legally binding arrangements without a formal contract. They also suggested that we allow them to use multiple trademarks.	We agree that the requirement for a contractual agreement is general, such that any legally binding business arrangement meets the provisions of this section. The regulations specify that the manufacturer may put another company's trademark on each label. There is nothing to restrict the manufacturer from putting different trademarks on different labels, as long as there is a contractual agreement with each company represented by the different trademarks.
1039.240–Deterioration factors: EMA noted that *and* should be changed to *or*.	We agree with the comment and have changed the regulations accordingly.
1039.625–Equipment manufacturer flexibility: EMA noted a typographical error in Table 1.	We agree with the comment and have changed the regulations accordingly.
1039.705–ABT calculations: EMA objected to our proposed provision to limit manufacturers' ability to include in ABT calculations those engines sold in states with separate emission standards.	California ARB has adopted our Tier 4 standards without any adjustments that would affect the stringency of standards. They also are not adopting any provisions that would require a separate calculation of ABT credits for engines sold in California. The proposed provision is therefore moot for the foreseeable future. If either of these factors change, we would intend to propose a regulatory provision requiring manufacturers to exclude California engines from their federal ABT calculations.
1039.101–Useful life: In response to our request for comment, EMA recommended keeping the provision to demonstrate shortened useful life. They further recommended adopting the analogous regulatory language for Large SI engines in part 1048.	We continue to believe that the provisions for a shorter useful life are less likely to be needed than they are for other programs; however, we believe it is appropriate to keep the regulatory option in place. Harmonizing these provisions across programs is also appropriate, so we have changed the regulatory language in §1039.101 to reflect the current provisions in part 1048.
We requested comment on the need to adopt provisions to address re-importation of certified engines that had gone into service outside the United States where the engine may have used fuel that compromised the effectiveness of the engine's emission-control system. EMA argued that this would be a minor problem and that the suggested fixes would be impractical and costly.	We will continue to monitor this situation and will consider regulatory provisions in the future if that is appropriate.

1039.501–Laboratory test systems: EMA commented that part 1065 already provides for the use of partial-flow sampling systems for transient PM measurements in the laboratory only after an equivalence demonstration, and that the standard-setting part should not impose any further restriction.	We agree with this comment and have taken out the specific reference to partial-flow sampling in §1039.501.
89.614: Manufacturers have expressed a need for an exemption that would allow them to import engines that are covered by a certificate, but are not yet in their certified configuration. Final assembly is planned inside the United States.	We are including in the final rule a cross reference in part 89 to 40 CFR 1068.330, which was designed for this situation.
89.915: Caterpillar commented that we should allow them to complete their engine assembly at different facilities, including some steps performed by another company under contract.	We have added a new provision allowing manufacturers to assemble engines in different locations, provided that they maintain control of the engines at all times, and inform us that they are using this exemption. We may require that manufacturers take certain steps to ensure that engines end up in their certified configuration.

In addition to these comments, we have identified a variety of additional minor changes and adjustments to include in the final rule, such as changes to correct organizational and nomenclature errors. In addition, these changes include:

- Revising §89.603 to clarify that the sales limit for ICI's importing engines certified to standards based on the original-production year are based on a corporate-wide basis, not a per-family basis. See the further discussion in Section II below.
- Removing §1039.260, since this section has been replaced by §1068.260.
- Adding a footnote to the table defining the transient duty cycle to clarify that percent torque is relative to maximum torque at the commanded engine speed.
- As described in Chapter 1, we identified a need to clarify a provisions related to the migration to the new test procedures in part 1065. We intend to upgrade to the more accurate test procedures for any confirmatory testing. For some provisions in part 1065, however, this would not be appropriate if manufacturers have not yet based their testing on the part 1065 procedures. We now specify that our testing will use the manufacturer's selected procedures for mapping engines, generating duty cycles, and applying cycle-validation criteria. For any other parameters, EPA may conduct testing using either of the specified procedures.
- As described in the preamble, we believe it is appropriate in response to a comment from another category to remove the requirement in §1039.120 to apply the emission-related warranty to components that are covered by a service contract purchased by the consumer, where the emission-related warranty was required to correspond with the service contract (or extended warranty).

II. Summary of Rulemaking Changes

We recently adopted a new tier of emission standards for nonroad diesel engines, codifying these standards in 40 CFR part 1039. That rulemaking led us to make several regulatory changes to the existing tiers of standards for these engines in 40 CFR part 89. In some cases, we discovered the

need for changes after publishing the proposed rule, but we did not make those changes to part 89 in the final rule out of concern that the public had not had an opportunity for comment. We are adopting these changes in this final rule. Similarly, we are adopting some adjustments to part 1039, based on information that surfaced late in, or shortly after, that rulemaking. The following changes in part 89 and part 1039 were in the proposed rulemaking, with any appropriate adjustments as noted above.

- §89.102: Clarify that equipment manufacturers using allowances under this section may use lower-emitting engines than we currently require.
- §89.110 and §89.1009: Allow manufacturers to identify a different company's name and trademark on the emission control information label, with additional provisions to ensure that operators take certain steps to ensure that operators have the full benefit of the emission-related warranty.
- §89.130: Refer to the nearly identical provisions for rebuilding engines in §1068.120. These requirements do not apply to Tier 1 engines at or above 37 kW.
- §89.410: Allow manufacturers to use ramped-modal testing, as specified for engines that must meet the Tier 4 standards.
- Appendix A to subpart F: Correct the ranges of values to address an unintentional gap for sales volumes between 300 and 500.
- §§89.913 and 89.914: Allow engine and equipment manufacturers to use the engine-dressing provisions in §§1039.605 and 1039.610.
- §89.1003: Clarify that engine manufacturers may ensure that the replaced engine is destroyed instead of taking possession of it; add a new label requirement for replacement engines that are allowed to meet a less stringent set of standards that are in effect when the replacement engine is built (to address the case where the engine being replaced was subject to emission standards less stringent than the current standards).
- §89.1003: Clarify that violating the requirements to rebuild an engine to its original configuration is considered tampering with respect to the applicable penalties.
- §89.1 and §1039.5: Allow manufacturers to include auxiliary marine engines in an engine family certified under part 89 or 1039, subject to certain limitations.
- §1039.1: Clarify that residence-time limits do not apply to engines used in stationary applications if they have been certified to nonroad emission standards.
- §1039.104, 1039.625, and 1039.655: Change cross-reference from §1039.260 to §1068.265.
- §1039.125: Clarify that a manufacturer's obligation to pay for scheduled maintenance under certain situations is limited to the useful life of the engine.
- §1039.225: Include a modified FEL as the basis for a change to the application for certification, consistent with current practice.
- §1039.240: Adding section references that were inadvertently omitted.
- §1039.510: Remove provisions that are now covered by part 1065.
- §1039.605 and §1039.610: Clarify the ABT responsibilities relative to engines or vehicles that are certified under the motor-vehicle program and used in nonroad applications.
- §1039.740: Correct the provisions allowing the use of emission credits from previous tiers of emission standards to include an item that was inadvertently omitted from the Tier 4 final rule, as described in the preamble to that final rule.

- §1039.801: Update various definitions to reflect the change to move the full text of these definitions to part 1068.

In addition, we are clarifying the standards applicable to Independent Commercial Importers under Part 89 Subpart G, which are also referenced in §1039.660. The applicable standards for nonroad diesel engines imported by ICIs are those that applied during the year of the original production of the engine. The current regulations were written when Part 89 was new and there was only one tier of standards. At that time, there were only two categories of engines– those produced before the date of applicable standards and those produced after. Engines produced before any applicable standards are clearly unregulated under the Act and may be imported without any modification (although that does not mean they can be freely installed in any piece of equipment). For those that were produced after the effective date of applicable standards, there was no question as to which set of standards applied (what we now call Tier 1). Unfortunately, no amendments were made to the ICI provisions as first Tier 2, then Tier 3 and finally Tier 4 standards were promulgated.

In Chapter 1, we explain that we are correcting text in the ICI provisions applicable to motor vehicles and motor vehicle engines to make clear that the applicable standards for those vehicles and engines are those of the original production year. There we set forth, from a 1996 final rule, that "many older vehicles cannot be modified to meet current year standards without extraordinary cost, which makes the conversion financially unfeasible for many owners of such vehicles." Particularly with the stringency of the Tier 4 standards, we believe that this statement also applies to past model year nonroad engines that might be imported by ICIs. Thus, we believe that the appropriate standards are those from the original year of production. However, as a precaution against the ICI program being used to circumvent new standards for large numbers of motor vehicles and motor vehicle engines, we are capping each ICI's usage of the program at a total of 50 light-duty vehicles and trucks, 50 motorcycles, and 5 motor vehicle engines in cases where the year of production standards are less stringent than the standards that apply during the year of modification.

We have issued only three certificates of conformity for nonroad engine ICIs in the history of our nonroad regulations, and each of those ICIs imported only a small number of engines. There are currently no ICIs with valid nonroad engine certificates. Additionally, the regulations generally require that, after certification, every third engine imported by an ICI be tested on an engine dynamometer under the federal test procedure (FTP). For these reasons, we do not believe that specifying original production year standards for these engines will lead to significant importation of older nonroad equipment or engines in the Tier 4 timeframe as a way to avoid incremental costs associated with Tier 4 engines. Still, as a precaution, we are capping the number of nonroad diesel engines that may be imported by an ICI in a given model year at 5 per year where the original production year standards are less stringent than those that apply during the year of modification. We believe this cap eliminates any concern that the goals of the Tier 4 program might be jeopardized, without impacting the current activities of any ICI.. We believe it is appropriate to take this action to provide the opportunity for ICIs to participate in the U.S. market. They have historically been small businesses and their existence may help to increase equipment choices available in the U.S. We believe, for example, that ICIs may at some point provide a mechanism for the importation of unique and highly specialized machines where volumes are so small that the original engine manufacturer

elects not to certify, so that the equipment might not be otherwise available in the U.S. We intend to monitor the usage of the ICI provisions when aftertreatment-based standards take effect for nonroad engines. If we believe that the ICI provisions are being misused, or adversely impacting air quality in a particular location, we will consider addressing the problem through future rulemaking.

Chapter 3: Marine diesel engines (40 CFR part 94)

This chapter contains an explanation of several changes and clarifications to our marine diesel engine emission-control program. We are adding a definition of amphibious vehicle and clarifying the meaning of auxiliary marine engine. We are also clarifying the application of certain certification flexibility provisions. These changes and clarifications are necessary to address issues that were raised by manufacturers and vessel owners as they implement this program. We received substantive comments on several of these changes, which are noted below along with our responses. The last section of this chapter contains a brief summary of comments on minor aspects of the program.

Note that the revisions described below do not affect the requirements contained in Annex VI, Air Pollution, to the International Convention on the Prevention of Pollution from Ships, 1978, as modified by the protocol of 1978 relating thereto. Engine manufacturers, boat builders, and vessel operators will be subject to those requirements once the Annex goes into force.[2]

3.1 Definition of Amphibious Vehicle (94.2)

3.1.1 Background

In our original nonroad diesel and marine engine emission-control programs, we adopted a definition of marine vessel that is consistent with the General Provisions of 1 U.S.C. 3. (see 40 CFR 89.2, 91.2, and 94.2). According to that definition, "the word 'vessel' includes every description of watercraft or other artificial contrivance used, or capable of being used, as a means of transportation on water."

In our recreational vehicle rule (67 FR 68242, November 8, 2002), we adopted a different definition of marine vessel for our standards for spark-ignition nonroad engines (40 CFR Parts 90 and 1048). According to this definition, a marine vessel is "a vehicle that is capable of operation in water but is not capable of operation out of water." This definition also specifies that "amphibious vehicles are not marine vessels." (40 CFR 90.2 and 40 CFR 1048.801). This modification was intended to address certain kinds of all-terrain vehicles that can be used on both land and water. These include the Argo and the Max all-terrain vehicles, which are offroad utility vehicles that can also be used in water. The body design of these nonroad vehicles allows them to float. They are propelled through

[2]Annex VI has been ratified by the required number of countries (15 countries representing at least 50 percent of the world's merchant shipping tonnage) and will enter into force May 20, 2005. The countries that have ratified are: Azerbaijan, Bahamas, Bangladesh, Barbados, Cyprus, Denmark, Germany, Greece, Liberia, Marshall Islands, Norway, Panama, Samoa, Singapore, Spain, Sweden, United Kingdom, and Vanuatu, representing about 59.9 percent of the world's merchant shipping tonnage. More information about this Convention can be found on our website, www.epa.gov/otaq/marine.htm and on the International Maritime Organization website, www.imo.org.

the water by their tires, which can act as linear propellers, or by a jet or other type of propeller. These vehicles are designed to carry up to six passengers or two passengers plus a payload and are often used as utility or research vehicles in wetlands and swampy areas. Some are also marketed for recreational fishing in such areas. Because these vehicles are primary intended for use on land, however, we determined that it is appropriate that they be certified to the applicable ATV or offroad utility vehicle standards.

We have since learned that there are similar amphibious vehicles that use compression-ignition engines. These include small vehicles like the Supacat as well as larger vehicles like the DUKW, LARC, and ALVIS STALWART.[3] The existence of these land/sea vehicles leads us to reconsider the definition of marine vessel in our other nonroad programs with the goal of treating such vessels the same across our programs and to have a uniform definition.

3.1.2 Definition of Amphibious Vehicle

For the purpose of our mobile-source emission-control program, we are defining amphibious vehicle as a vehicle with two or more wheels or with tracks and which is designed to be operated primarily on land but is also capable of operating in water. Amphibious vehicles are not considered marine vessels and are instead subject to the emission standards that apply to the land-based equivalent of the vehicle. We believe this approach is appropriate, because it subjects all vehicles of a similar nature to the same set of emission standards. Otherwise, a manufacturer who makes available a marine-capable version of a land-based vehicle would have to certify the vehicle to two different standards.

We are adding this definition to our regulations for land-based compression-ignition nonroad engines (40 CFR 89), spark-ignition marine engines (40 CFR 91), compression-ignition marine engines (40 CFR 94), spark-ignition nonroad engine below 19 kW (40 CFR 90), spark-ignition nonroad engine above 19 kW (40 CFR 1048), and recreational vehicles (40 CFR 1051). We are also making the necessary changes to the definition of marine vessel in those regulations.

3.1.3 Applicable Emission Standards

Amphibious vehicles can be street-legal, such as excursion vehicles for tourism purposes (e.g., TrolleyBoats) or designed only for off-highway use (e.g., Argo, Max, DUKW). The applicable emission standards are those that apply to the land-based application. This means that any vehicle

[3]According to the U.S. Coast Guard, the three main types of vehicles used in the amphibious industry today were originally designed as military transports and are known as DUKWs (D=1942; U=Utility; K=Front Wheel Drive; and W=Two rear driving axels), LARCs (Lighter, Amphibious, Resupply, Cargo), and ALVIS STALWARTs. DUKWs were originally manufactured in the early 1940s for the U.S. Army, while LARCs were manufactured for the Navy. STALWARTs were manufactured for the British Army in the late 1960s. See Navigation and Vessel Inspection Circular No. 1-01, Inspection of Amphibious Passenger Carrying Vehicles, COMDTPUB P16700.4 NVIC 1-01, 11 December 2000.

that meets our definition of "motor vehicle" in 85.1703(a) must meet the highway emission standards that would otherwise be applicable to the vehicle if it were not capable of operating in water. So, for example, a street-legal TrolleyBoat must have an engine that meets our standards for heavy-duty highway diesel engines.

If an amphibious vehicle is not street-legal, i.e., it is designed only for off-highway use, then it must meet the emission standards in effect for a similar nonroad vehicle. If it has a compression-ignition engine (e.g., a DUKW), it must be certified to meet our nonroad diesel engine standards. If it has a spark-ignition engine, it must be certified to meet the applicable nonroad standards: all-terrain vehicle standards, small SI (<19 kW) standards, or large (>19 kW) SI standards (see table X.1-1).

Table 3.1-1
Application of Nonroad to Amphibious Vehicles

Cycle	Terrain	Vehicle Characteristics	Applicable Standards
Spark-ignition	Rough	Saddle and handlebar	ATV
	Rough	No saddle, <25 mph	Small SI
	Rough	No saddle, >25 mph	ATV
	Non-rough	<19 kW	Small SI
	Non-rough	>19 kW	Large SI
Compression-Ignition	Rough or non-rough	Any	Nonroad CI

The new definition of amphibious vehicle and revision of our definition of marine vessel are intended solely for the purpose of our national emission-control programs. These definitions do not affect in any way how these vehicles are treated by the U.S. Coast Guard or any other federal, state, or local agency that may have requirements for the safety, registration, or operation of such vehicles. It also does not affect the requirements for amphibious vessels under MARPOL Annex VI. Specifically, after the Annex comes into force, amphibious vessels with diesel engines above 130 kW that are built or undergo a major conversion on or after January 1, 2000, will be required to have MARPOL-compliant engines as demonstrated by an Engine International Air Pollution Prevention (EIAPP) certificate and related documentation (Technical File and Record Book of Engine Parameters). In addition, vessels above 400 gross tons will be required to have an International Air Pollution Prevention (IAPP) certificate. These requirements are described in our rulemaking for marine diesel engines at or above 30 liters per cylinder, which is available on our website, <www.epa.gov/otaq/marine.htm>.

3.1.4 Hovercraft

We have learned that there are small hydrofoils (hovercraft) that can also operate on land as well as water. One example is the Griffon Hovercraft, which includes models weighing from 825 to 2,200 lbs, with the ability to carry 5 to 80 passengers.

A hovercraft is not considered an amphibious vehicle under the above definition because it has neither wheels nor tracks. Instead, it is considered a marine vessel and its engines are subject to our marine engine emission-control program. To meet these requirements, a hovercraft manufacturer may either purchase and install a certified marine engine or take advantage of our marine engine dresser provision. This provision allows an engine manufacturer, post-manufacturer marinizer, or boat builder to install a certified land-based nonroad or highway engine on a marine vessel as long as the engine has a valid certificate of conformity, it is properly labeled, and no changes are made to the engine that could reasonably be expected to increase its emissions. There are certain conditions associated with this flexibility: the original engine label must be clearly visible, a supplemental label must be affixed to the engine identifying it as a dressed engine, and certain information must be submitted to EPA with respect to the engine and the identity of the manufacturer. Section 3.4, below, has additional information about our engine dresser program.

3.2 Auxiliary Engines (94.2)

3.2.1 Background

In our December 1999 marine diesel engine rulemaking, we adopted a definition of "marine engine" that is based on whether an engine is installed or intended to be installed on a marine vessel (40 CFR 94.2). Some manufacturers have requested further interpretation of the phrase "installed or intended to be installed" as used in the definition to determine whether their engines are subject to emission standards for land-based or marine engines.

The definition adopted in 1999 states:

> Marine engine means an engine that is installed or intended to be installed on a marine vessel. This definition does not include portable auxiliary engines for which the fueling, cooling and exhaust systems are not integral parts of the vessel. (64 FR 73334)

In our rule, we explained some background we considered in adopting this definition:

> In the final land-based nonroad engine rule, we determined that a portable auxiliary engine used onboard a marine vessel should not be considered a marine engine (October 23, 1998, 63 FR 56967). Instead, a portable auxiliary engine is considered to be a land-based engine subject to the requirements of 40 CFR Part 89. To distinguish a marine auxiliary engine installed on a marine vessel from a land-based portable auxiliary engine used on a marine vessel, we specified in that rulemaking that an auxiliary engine is installed on a marine vessel if its fuel, cooling, or exhaust systems are an integral part of the vessel. These auxiliary engines are therefore not fundamentally different than land-based engines and we regulate them under 40 CFR Part 89. (64 FR 73302, discussing EPA's determination in "Summary and Analysis of Comments: Control of Emissions from Nonroad Diesel Engines," August 1998, p. 92)

The regulatory text and explanation in the final rule permit some narrow amount of portability for an engine to be considered "installed or to be installed on a marine vessel" and thus a marine engine. However, this portability is limited to engines that have systems that are integral to the vessel. If the engine does not have systems that are integral to the vessel, it will be considered a land-based nonroad engine.

3.2.2 Clarification of "portable"

Since we finalized the above definition, we learned that there continues to be confusion about what is meant by "portable" in our definition of marine engine. At least one engine manufacturer sought further clarification about whether, for example, an engine that is attached to a barge would be considered portable.

EPA will not consider an engine "installed" if it can easily be removed from a vessel to provide power to another application without modifications. In this case, a pump engine that is bolted onto the main deck of a boat or barge will not be considered installed if it can be readily disconnected from the pump machinery and lifted off the vessel to power a pump (or other device) elsewhere. Such an engine operates more as a stand-alone auxiliary engine than a marine engine. In contrast, EPA will consider an engine installed if it is mounted in such a way that requires significant effort to remove the engine (i.e., there is more to the mounting than a few brackets or straps).

The one exception to this "removability" interpretation of the regulation is for those engines that can easily be removed from a vessel, but whose fueling, cooling or exhaust systems are integral to the vessel. Such an engine, though conceptually portable because of its relationship to the vessel, cannot operate without a connection to the vessel. For example, if a portable engine is designed with a quick-connect access to the onboard fuel supply or with other hardware that allows the engine to tie into the vessel's cooling or exhaust systems, EPA will consider such an engine installed. Even though it is portable, such an engine generally cannot operate without the fueling or other systems available on the vessel. In other words, it cannot be operated once it is removed from the vessel.

One commenter requested further clarification. This commenter assumed that a "non-integrated" auxiliary engine such as a generator set or air compressor that sits on the deck of a marine vessel would be considered to be subject to Part 89. According to the above discussion this would be correct only if none of the criteria that make an engine a marine diesel auxiliary engine are met. As explained above, a marine diesel engine is characterized by how it is installed or intended to be installed on a vessel. The fact that a generator set or air compressor "sits on the deck of a marine vessel" is not in and of itself enough to ensure that the engine is covered by Part 89. What matters is if its fuel, cooling, exhaust or other systems are an integral part of the vessel, i.e., whether the engine can be removed from a vessel to provide power to another application without modification. If an engine can be removed in this way, it operates more as a stand-alone auxiliary engine than a marine engine. If the engine is mounted in such a way that would require significant effort to remove the engine (i.e., there is more to the mounting than a few brackets or straps) it is considered a marine engine.

3.2.3 Regulatory revision

The clarification described in this section does not require further regulatory text in 40 CFR 94. However, we are adding this definition to our other nonroad programs, including our land-based compression-ignition nonroad engine regulations (40 CFR 89), our spark-ignition marine engine regulations (40 CFR 91), our spark-ignition nonroad engine <19 kW regulations (40 CFR 90), and our spark-ignition nonroad engine >19 kW regulations (40 CFR 1048).

3.3 Certification of Marine Auxiliary Engines (94.912)

3.3.1 Background

As explained above, an auxiliary engine would be considered a marine auxiliary engine if (1) it is tied to the ship's fuel, cooling, or exhaust systems, or (2) it is mounted on the vessel in such a way that requires significant effort to remove it.

The general industry practice is to produce marine engines by modifying land-based engines so they are suitable for marine application. The most important changes usually relate to tuning the power characteristics for marine propulsion, adapting the engine for use with water-based cooling, and changing various parts for improved corrosion resistance or compliance with Coast Guard requirements. In these cases, the changes made to the engine may affect its emission characteristics and therefore certification to the marine standards is required. However, manufacturers have also informed us that they sometimes sell engines for marine auxiliary service that are identical to land-based engines. These engines are not modified for use on marine vessels; however, they fall under the definition of marine engine because they are installed on the vessel in such as way that they are not easily removed. To avoid the regulatory and compliance burdens associated with certifying identical auxiliary engines under two separate programs, land-based and marine, we are adopting provisions to allow streamlined certification.

3.3.2 Streamlined certification for marine auxiliary engines

Under the streamline certification approach for marine auxiliary engines, manufacturers may include auxiliary marine diesel engines in a land-based engine family certified under 40 CFR part 89 or 1039, with the following conditions:

- The marine engine must be identical in all material respects to a land-based engine covered by a valid certificate of conformity;
- The marine engine may not be used as a propulsion engine;
- The engine must have the emission control information label required under the land-based program, including additional information to identify the engine as certified also for marine auxiliary purposes;
- The number of marine engines in the engine family must be smaller than the number of land-based engines; and

- The application for certification must identify the possibility of marine auxiliary installations, including projected sales of marine engines; if the projected marine sales are substantial, we may ask for the year-end report of production volumes to include actual marine auxiliary engine sales.

The requirement that the marine engine be identical in all material respect to a land-based engine covered by a valid certificate of conformity means that there must be no changes to the engine for use in the marine application. There can be no changes to the fuel system, the turbocharger, the cooling system requirements or any other characteristic that may affect emissions. The engine must be able to be used interchangeably in a marine or land-based application without modification.

This streamlined certification for auxiliary engines is intended solely for the purpose of our national emission-control programs. This streamlined certification does not affect in any way how these engines are treated by the U.S. Coast Guard or any other federal, state, or local agency that may have requirements for the safety, registration, or other operation of such engines. It also does not affect the requirements for auxiliary engines under MARPOL Annex VI.[4] Specifically, after the Annex comes into force, any diesel engine above 130 kW installed on a marine vessel constructed on or after January 1, 2000, and any engine above 130 kW that undergoes a substantial conversion on or after January 1, 2000, will be required to be MARPOL-compliant as demonstrated by an Engine International Air Pollution Prevention (EIAPP) certificate and related documentation (Technical File and Record Book of Engine Parameters). Therefore, engine manufacturers who take advantage of the streamlined certification for auxiliary engines and who may sell those engines for use on vessels subject to MARPOL Annex VI should make sure they obtain the necessary MARPOL Annex VI certification when they apply for certification of their land-based family. The MARPOL Annex VI requirements are described in our rulemaking for marine diesel engines at or above 30 liters per cylinder, which is available on our website, <www.epa.gov/otaq/marine.htm>.

We received two comments on this provision, recommending that the requirements for additional information on the engine label and sales projections be deleted. We disagree with the recommendation to delete the requirement that the emission control label identify the engine as being certified for marine auxiliary applications. In general, any marine diesel engine installed on a vessel must be compliant with the marine diesel emission program. This is demonstrated by the manufacturer's label. Because these auxiliary engines are still marine engines, they must also be labeled as such. Without this label, the vessel manufacturer or owner will not know if they are purchasing and installing an auxiliary engine that is certified for use in a marine application. In addition, the absence of a label may lead vessel manufacturers and owners to form the mistaken impression that any nonroad auxiliary engine is suitable for installation on a marine vessel. The label will indicate that the engine is either certified under Part 94 or it falls under the streamlined

[4]MARPOL Annex VI is Annex VI, Air Pollution, to the International Convention on the Prevention of Pollution from Ships, 1978, as modified by the protocol of 1978 relating thereto. More information about this Convention can be found on our website, www.epa.gov/otaq/marine.htm and on the International Maritime Organization website, www.imo.org.

certification program and the engine manufacturer has met the requirements set out in 94.912. Otherwise, there would be no mechanism to determine if an engine certified under Part 89 has met the requirements. The people who are intended to be informed by this information are boat builders, vessel owners, and various inspection personnel. Recognizing that the engine manufacturer may not know when the engine is produced if it will be used in a marine application, the entity exercising the exemption will be the entity required to attach this label to the engine.

We also do not agree with the recommendation to delete the request for sales projections to determine that the marine auxiliary engines do not represent more than 50 percent of the annual sales of an engine family. The commenter wrote that the engine manufacturers may not be able to predict at the time of certification the number of engines sold into marine applications. We do not find this reason compelling and continue to believe that engine manufacturers should be able to reasonably estimate, based on past sales or their internal sales projections, the proportion of an engine family's sales that are expected to go into marine applications. It should be remembered that this program is intended only for those marine auxiliary engines that are exactly identical to their land-based counterparts (no changes to any aspect of the engine for installation on a marine vessel). We do not believe there will be substantial numbers of engines that will meet the requirements of this program, since most engines that are installed on a vessel are modified in some way. Finally, regardless of EPA's program, engine manufacturers will need to account for at least those engines that qualify that are above 130 kW, since those engines may still need to be certified to the NOx standards of MARPOL Annex VI.

3.4 Engine Dressing Provisions (94.907)

3.4.1 Background

Some companies produce marine engines by modifying new, land-based engines and modifying for installation on a marine vessel. This can be done in a way that does not affect emissions. For example, the modifications may consist of adding a generator or reduction gears for propulsion. It can also involve installing a new marine cooling system that meets original manufacturer specifications and duplicates the cooling characteristics of the land-based engine, but with a different cooling medium (i.e., water). This is similar to the process of buying certified land-based engines to make a generator or other equipment. This simplified approach of producing an engine can be described as dressing an engine for a particular marine application. Because the modified land-based engine is subsequently used on a marine vessel, however, it will be considered a marine diesel engine pursuant to our definition of marine engine.

We included a provision in our final commercial marine diesel engine rule that exempts engines from the marine certification requirements if the marinizing company meets the following conditions (64 CFR 73303, December 29, 1999; see 40 CFR 907):

- The engine being dressed, (the "base" engine) must be a heavy-duty highway, land-based nonroad, or locomotive engine, certified pursuant to 40 CFR 86, 40 CFR 89, or 40 CFR 92. The base engine must be certified to the standards that apply at the time the base engine

manufacturer completes assembly of the engine. We don't allow stockpiling of uncertified engines.

- The dressing process must not involve any changes that could reasonably be expected to increase engine emissions. This includes a requirement that engine cooling and aftercooling systems stay within the ranges specified by the original engine manufacturer.
- The original emissions-related label must remain on the engine.
- The dressing company must report annually to us the models that are exempt under this provision.
- The engine model must not be primarily for marine application.

Note that the goal of our engine dressing provisions is to eliminate the burden of certification and other compliance requirements where we have confidence that an engine already certified to comparable standards for another program will meet marine engine emission standards. However, the certificate holder for the base engine continues to be liable, under the terms of the original certification, for the emissions performance of the dressed engine.

3.4.2 Regulatory Changes

The engine dresser provisions as they are currently written can be exercised by engine manufacturers, including post-manufacturer marinizers.[5] We are expanding the list of companies that can use this flexibility to include boat builders that produce a marine engine by installing a non-marine engine on a vessel without substantially modifying it. This provision is intended to cover circumstances, like the hovercraft example described in Section 3.2, in which a vessel manufacturer uses a highway or nonroad engine on a vessel but does not modify it in any way that could affect its emissions. In the hovercraft example, the engine is used to run an air compressor that inflates the floating platform and generates air turbulence to propel the vessel forward. The engine does not require marine engine cooling systems, it is not adjusted to provide more power, and it requires no special fuel handling systems. A similar situation exists for airboats, where a highway or nonroad engine is used to run a large fan to propel the vessel forward. Because such engines are installed on a vessel they are considered to be marine engines. Under our existing programs, the boat builder manufacturer must certify the engines as marine engines even if they have a certificate of conformity under our highway or nonroad emission-control programs because they do not qualify as engine manufacturers or post-manufacturer marinizers. The revised regulations make clear that these vessel manufacturers also qualify for the engine dressing exemption.

In addition, we are clarifying the provision regarding the requirement to demonstrate that the engine model is not primarily used in marine applications. This demonstration requires that the engine manufacturer show that fewer than 50 percent of the engine model's total sales for the model year are dressed engines. This includes engines dressed by others as well as the manufacturer of the base engine. This can be shown based on sales information. Engine dressers who are not also the

[5]Post-manufacturer marinizers are companies that produce a marine engine by modifying a non-marine engine and vessel manufacturers that substantially modify marine engines.

manufacturer of the base engine must get the original manufacturer to confirm that the engine is not primarily a marine engine.

We are also clarifying the requirements related to generating and using emission credits with these engines. Engines adapted for marine use through the engine dressing provisions may not generate or use emission credits under part 94. However, they may generate credits or use credits under the averaging, banking, and trading (ABT) provisions of the program under which they are originally regulated (highway, land-based nonroad, locomotive).

One commenter wrote that we should revise the proposed regulatory language to delete paragraph (g) regarding failure to comply because it restates the obvious point that engines not meeting the requirement set out in 94.907 are not eligible for the exemption. The purpose of paragraph (g) is to clarify that if an engine that takes advantage of this exemption is not in fact exempt (it does not meet the criteria set out in 94.907), then not only is the engine not certified under Part 94 but in addition the engine manufacturer has violated the prohibited acts described in 94.1103(a)(1) and may be subject to penalties. While this may be obvious to large engine manufacturers, it may not be obvious for small engine manufacturers for whom this provision was originally intended. It is also important to clarify exactly which regulatory prohibitions apply, since this exemption addresses engines that are at varying stages subject to different provisions.

This commenter also wrote that the use of the word “eligible” in (d) does not seem to be appropriate. We describe the engines as “eligible” for the exemption simply because manufacturers may in some cases choose to certify the engines to the standards in part 94, even though the earlier certification could be used to meet the requirements of part 94. In such a case, an eligible engine is not exempt until the manufacturer exercises the provisions of this section.

3.4.3 Requirement to Submit Emission Data

Under our existing program, base engine manufacturers utilizing the dressing exemption must submit marine-specific emission data on their dressed marine engines. In addition, we may request marine-specific data from the original engine manufacturer if another company is dressing their engines for marine application. We are not changing this provision.

We intend to use this data for program oversight, to determine the validity of the exemption. This is important because marine engines are not operated in the same way as highway or land-based nonroad engines. This is reflected in the different duty cycles used for certification testing.

Specifically, we will use the test data to evaluate the extent to which the highway or land-based nonroad engines can be expected to achieve our marine engine emission limits when operated as marine engines. If we find that highway or land-based nonroad engines exceed the marine standards based on the marine duty cycle we will consider suspending this flexibility. The suspension of this flexibility would not affect marine engines already in the fleet, unless there is a substantial emission exceedence.

Using the data obtained under the engine dresser flexibility program to evaluate the validity of the exemption suggests that engine manufacturers will need to design their highway or land-based nonroad engine certification test programs to include the marine duty cycle if the engine may be sold into a marine application. We do not believe this will be burdensome, especially considering that the alternative is to do a full certification application for the marine engine.

As discussed above, land-based engines that are credit-users are eligible for the engine dressing exemption. Although they are properly certified, such dressed marine diesel engines may exceed the marine emission standards. We will take ABT credit use into account when we evaluate the validity of the program.

3.4.4 Other engine dressing provisions remain unchanged

The other components of our engine dressing provisions remain unchanged. These include the following:

- Any certified heavy-duty highway, nonroad, or locomotive engine will be eligible for the dressing exemption.
- The marine not-to-exceed (NTE) zone provisions do not apply to dressed engines, unless NTE provisions are in place for the certified base engine.
- Engines that qualify as dressed engines are considered to have a certificate under regulatory programs for both land-based and marine engines.
- If we find that a company with an engine dressing exemption does not, in fact, meet the criteria spelled out in the regulations, the engines are not exempt and we may pursue enforcement for selling uncertified marine engines and/or tampering with certified engines.
- The engine dressing company must put a supplemental label on each exempted engine stating the name of the dressing company and the fact that the engine was marinized without affecting emission controls. This will make clear that the engine is acceptable for use in a marine vessel. In addition, dressing companies will need to give us minimal notification that they are modifying certified engines. This can be done once annually for a company's whole range of dressed marine engines.

In addition to the labeling requirement, we encourage engine manufacturers to inform companies dressing their engines of these requirements. This will not only aid us in educating affected companies, it may help protect engine manufacturers from exposure to liability if their engines are ever found in a marine vessel without proper documentation.

The dressing provisions are intended solely for the purpose of our national emission-control programs. This streamlined certification does not affect in any way how these engines are treated by the U.S. Coast Guard or any other federal, state, or local agency that may have requirements for the safety, registration, or other operation of such engines. It also does not affect the requirements for

engines under MARPOL Annex VI.[6] Specifically, after the Annex comes into force, any diesel engine above 130 kW installed on a marine vessel constructed on or after January 1, 2000, and any engine above 130 kW that undergoes a substantial conversion on or after January 1, 2000, will be required to be MARPOL-compliant as demonstrated by an Engine International Air Pollution Prevention (EIAPP) certificate and related documentation (Technical File and Record Book of Engine Parameters). Therefore, engine manufacturers who take advantage of the engine dressing provisions and who may sell those engines for use on vessels subject to MARPOL Annex VI should be sure they obtain the necessary MARPOL Annex VI certification when they apply for certification of their land-based family. The MARPOL Annex VI requirements are described in our rulemaking for marine diesel engines at or above 30 liters per cylinder, which is available on our website, <www.epa.gov/otaq/marine.htm>.

3.5 Engine Repowers (94.1103(b))

We have received several requests for clarification about vessel repowers. Much of the existing confusion results from the fact that our marine engine program and the Annex VI program are slightly different and have different results depending on whether the engine used to repower the vessel is new or used.

3.5.1 Repowering With a New Engine

If a vessel owner is going to replace an existing engine on an existing vessel with a *new* engine, then the new engine must comply with the requirements of MARPOL Annex VI and the EPA program. Under MARPOL Annex VI, the engine must meet the Regulation 13 NOx limits (it must have a Statement of Voluntary Compliance or an EIAPP). Under the EPA program, the engine must comply with the emission limits that are in effect when the repower occurs. Note that if the replacement engine is certified to our Tier 2 standards it should also have a Statement of Voluntary Compliance or EIAPP and therefore will meet both the MARPOL Annex VI NOx requirements and the EPA requirements.

We provide an exemption in 40 CFR 94.1103(b)(3) which allows a vessel owner to replace an existing engine with a new uncertified engine or a new engine certified to an earlier standard engine if it can be demonstrated that no new engine that is certified to the emission limits in effect at that time is produced by any manufacturer with the appropriate physical or performance characteristics needed to repower the vessel. In other words, if a new certified engine is not available that can be used, an engine manufacturer may produce a replacement engine that does not meet all of the requirements of our marine emission-control program. For example, if an vessel has twin uncertified engines and it

[6]MARPOL Annex VI is Annex VI, Air Pollution, to the International Convention on the Prevention of Pollution from Ships, 1978, as modified by the protocol of 1978 relating thereto. More information about this Convention can be found on our website, www.epa.gov/otaq/marine.htm and on the International Maritime Organization website, www.imo.org.

becomes necessary to replace one of them, the vessel owner can request approval for an engine manufacture to produce a new uncertified engine if it can be demonstrated that the vessel will not function properly if the engines are not identically matched.

There are certain conditions for this exemption. The replacement engine must meet standards at least as stringent as those of the original engine. So, for example, if the original engine is a pre-Tier 1 engine, then the replacement engine need not meet emission limits. If it is a Tier 1 engine, it need not meet the Tier 2 limits if those are the limits in place when the replacement occurs. It should be noted, however, that engines that qualify for this exemption may still be subject to the Annex VI engine requirements. The Annex VI NOx limits apply to any engine that undergoes a major conversion on or after January 1, 2000. This includes the case where an engine is replaced by a new engine built on or after January 1, 2000. If a new replacement engine is installed, that engine must be certified to the Annex VI NOx limits.

Also as a condition for the exemption, the engine manufacturer must take possession of the original engine or make sure it is destroyed. In addition, the replacement engine must be clearly labeled to show that it does not comply with the standards and that sale or installation of the engine for any purpose other than as a replacement engine is a violation of federal law and subject to civil penalty. Our regulations contain the information that must be on the label; we are adding a provision to cover the case where the engine meets a previous tier of standards.

One commenter objected to the new label provision, asserting that such a requirement would be overly burdensome on the engine manufacturers. This is because the requirement would require the engine manufacturer to create a different label for every rating that it wants to continue to sell as replacement engines. The commenter also objected to the provision requiring a determination by the Administrator that no certified engine is produced by any manufacturer with the appropriate physical or performance characteristics needed before it allows an engine manufacturer to produce and sell an uncertified replacement engine. The commenter wrote that this requirement "imposes an unreasonable and onerous burden on engine manufacturers." The replacement engine situation typically arises when there is a catastrophic failure of an engine. Waiting for the Administrator to make a determination may take a considerable amount of time, which could impose significant costs on the vessel owner. The commenter recommended that EPA modify this provision to make it consistent with §89.1003(b)(7), which allows the engine manufacturer to make the determination.

With regard to the labeling requirements, we are revising the requirements to be consistent with the provisions we are finalizing for nonroad diesel engines (see Chapter 2). We continue to believe it is important to label these replacement engines to ensure that the ship owner understands his responsibilities with regard to the replacement engine, that a vessel surveyor can verify that the engine is compliant, and that the engine is not used for unauthorized purposes at some later date. We believe that the simplified language for the label will make it easier for engine manufacturers to comply with this requirement.

We did not propose to revise the requirement that the determination be made by the Administrator that no compliant engine will meet the appropriate physical or performance

characteristics needed before an engine manufacturer may produce and sell an uncertified replacement engine. We originally adopted the provision as it is because marine vessels are different from other types of nonroad equipment in that the physical and performance constraints for replacement engines are not as great. Most nonroad equipment have tightly constrained engine compartments that impose physical limitations on replacement engines. This is not the case for most marine vessels, given the large size of the engine compartment and potentially greater flexibility in how an engine is installed.

In subsequent discussions, engine manufacturers indicated that their concern about the Administrator determination arises from the time constraint associated with the conditions under which a vessel owner would be requesting a replacement engine. This typically occurs when there has been a catastrophic engine failure. In these cases the vessel is not usable until a replacement engine is found and installed. The engine manufacturers are concerned that Administrator review would take a considerable amount of time. In addition, they are also concerned that reviewing all potential replacement engines for suitability would also take a lot of time.

After considering these comments, we are revising this provision to allow manufacturer determination that no compliant engine can be used for a replacement engine, provided that certain conditions are met. First, the manufacturer must deterimine that no certified engine is available, either from its own product lineup or that of the manufacturer of the original engine (if different). In cases where a vessel owner simply wants to replace an engine with a new version of the same engine as part of a vessel overhaul for example, it will still be necessary to obtain Administrator approval. Second, the engine manufacturer must document the reasons why an engine of a newer tier is not usable, and this report must made available to EPA upon request. Finally, no other significant modifications to the vessel can be made as part of the process of replacing the engine, or for a period of 6 months thereafter. This is to avoid the situation where an engine is replaced prior to a vessel modification that would otherwise result in the vessel becoming “new” and its engines becoming subject to the new engine standards. In addition, the replacement of important navigation systems at the same time may actually allow the use of a newer tier engine.

3.5.2 Repowering With a Used (Rebuilt) Engine

If a vessel owner replaces an existing engine with a used (rebuilt) engine, then that replacement engine is not required to be certified to our marine standards.

Note however, that if a vessel owner is going to replace an existing engine on an existing vessel constructed on or after January 1 2000 with a used (rebuilt) engine, the engine must comply with the requirements of MARPOL Annex VI. Under these requirements, the Annex VI NOx limits apply if the used (rebuilt) engine undergoes a major conversion. This means it is substantially modified during the rebuilding process (e.g.,more was done than simply replacing used parts with identical new part) or it has a maximum continuous rating more than 10 percent higher than the old engine. If the original engine is being replaced by an identical used (rebuilt) engine, then there are no Annex VI emission requirements for the used (rebuilt) engine.

The MARPOL Annex VI requirements apply to diesel marine engines above 130 kW. If the engine is not a diesel engine or is a diesel engine at or below 130 kW, then there are no requirements for the used (rebuilt) engine under Annex VI.

3.5.3 Disposal of the Replaced Engine

Our current regulations require the engine manufacturer to take possession of the engine that is replaced. We are revising this provision to allow the manufacturer to confirm that the engine has been destroyed instead.

3.6 Other Revisions

3.6.1 Excluded and Exempted Engines (94.904)

We are adding a new provision to Subpart J, Exclusion and Exemption Provisions, to allow an engine manufacturer to take an action with respect to an exempted or excluded engine that would otherwise be prohibited, such as selling it. Before the engine manufacturer can take such an action, the engine must either be certified or modified to make it identical to an engine that is already covered by a certificate.

One commenter recommended that EPA delete this provision, noting that the language of the exemption, "If you want to take an action with respect to an exempted or excluded engine that is prohibited by the exemption or exclusion, such as selling it, you need to certify the engine" appears to restate the obvious.

The purpose of the new language in 94.904 was intended to explicitly allow the engine manufacturer to remove an engine from exempted or excluded status and allow it to be transferred to an ultimate purchaser or owner or some other action to be taken. Otherwise, it is not clear that the exempted or excluded designation can be changed once it is applied to an engine. This provision also describes what must be done to the otherwise exempted or excluded engine to allow such an action: it must be certified or made identical to a certified engine. This is identical to the provision we recently adopted for nonroad land-based diesel. We are finalizing the provision as proposed.

3.6.2 Requirements Applicable to Vessel Manufacturers, Owners, and Operators (94.1001)

We considered revising the applicability provisions in §94.1001 in Subpart K, Requirements Applicable to Vessel Manufacturers, Owners, and Operators, to specify that some of the requirements in that subpart apply to manufacturers, owners, and operators of marine vessels that contain engines with per-cylinder displacement of at least 2.5 liters. Currently, the provisions in this subpart apply only to manufacturers, owners, and operators of marine vessels that contain engines with per-cylinder displacement at or above 30 liters.

One commenter objected to this change, noting that the requirement in 94.1003(c) that requires vessel manufacturers, owners, and operators to allow emission tests and inspections to be conducted

and provide reasonable assistance to perform such tests or inspections would be too onerous for vessels smaller than those with Category 3 marine diesel engines. This commenter noted that this requirement "infringes on the rights of vessel owners and operators by requiring them to make their vessels available for testing and inspections." The commenter also note that EPA proposed this change without consulting with owners and operators of smaller vessels. The commenter recommend that, at minimum, EPA specify that 94.1004(a), (d), and (e) do not apply to smaller vessels.

We agree with this comment and are retaining the applicability of these requirements to engines with per-cylinder displacement at or above 30 liters with minor editorial changes to reflect that the requirements apply only to Category 3 marine diesel engines. We are also modifying §94.211(k), which originally specified that engine manufacturers must provide the Technical File required under MARPOL Annex VI to boat owners; we believe this provision should apply only to Category 3 engines at this time. Note that some of the provisions outlined in this section are the same as those required by MARPOL Annex VI and the NOx Technical Code, and that those provisions will apply to engines above 130 kW once the Annex goes into force.

3.6.3 Useful Life

One commenter wrote that the current useful life periods for marine diesel engines are "arbitrarily" set at 10,000 hours for Category 1 engines, 20,000 hours for Category 2 engines, and 1,000 hours for recreational engines. This commenter "believes that these values do not fairly represent the useful lives of current marine engines and that this section should be changed accordingly." They also provided a proposal for changing the prescribed useful life periods.

We acknowledge the commenter's concern about the length of the useful life period for marine diesel engines. The rationale for the useful lives in our current regulations is set out in our previous rulemakings (see 64 FR 73300, December 29, 1999 and 67 FR 68242, November 8, 2002. A revision of these periods was not proposed and would require considerable analysis of data about the ways in which these engines are used that are not available at this time. It would also require considerable discussion with many engine manufacturers, including recreational marine diesel engine manufacturers, as well as with other stakeholders. Because the information presented is not substantial enough to justify revision of the useful lives in our current regulations , we are not adopting any changes to our useful life provisions in this action. Instead, we will consider the proposal as we develop our new marine diesel engine proposal (see Advance Notice of Proposed Rulemaking, Control of Emissions of Air Pollution from New Locomotive Engines and New Marine Compression-Ignition Engines Less Than 30 Liters per Cylinder, 69 FR 39276, June 29, 2004).

3.6.4 Test Cycle

One commenter requested EPA allow the use of the E3 duty cycle for certifying propeller-law operated variable-speed auxiliary engines as an optional alternative to the use of the C1 duty cycle. Another commenter subsequently informed EPA that this revision is needed because auxiliary engines that are used to drive liquid pumps operate in such a way that the "load used to drive it is proportional to the engine speed cubed ... which is the same as a propeller curve." Consequently, it

would make more sense to use the E3 duty cycle for engines operated in that way. This is not currently possible because the provisions of §94.105(b) state that the E3 cycle applies to propulsion engines with fixed-pitch propellers and engines for which the other specified duty cycles do not apply.

After consideration of this issue we agree that the E3 cycle most appropriately tests marine auxiliary engines used in this way. Therefore, we are revising §94.105(b) to clarify that some marine auxiliary engines can be certified using the E3 duty cycle, so long as the manufacturer can demonstrate, as is the case with auxiliary engines used to drive liquid pumps, that the E3 cycle is more appropriate than any of the other specified cycles. It should be noted that MARPOL Annex VI allows use of the E3 duty cycle for propeller-law-operated main and propeller-law-operated auxiliary engines.

3.6.5 Miscellaneous Corrections.

We are making the following additional changes to address minor corrections from the proposal:
-94.2 Definitions: Remove obsolete definitions for auxiliary and propulsion engines.
-94.9 Useful life: We are revising the provisions for manufacturers to request a shorter useful life with the similar provisions already in place for Large SI engines, consistent with comments received from manufacturers or marine diesel engines. This also involves labeling engines with useful-life information only if the applicable useful life is different than the specified default values.
-94.12 Small-volume provisions: Fix cross references.
-94.106 NTE testing procedures: Fix the formula for the lower bound on the NTE zone to match the formula given in the corresponding figure.
-94.212 Labeling: Correct improper reference, and remove the requirement to include useful life from the label in situations where the manufacturer uses the default value specified in the regulation. Manufacturers would need to include useful life on the label only if they specify a shorter or longer useful life under the provisions of §94.9(a)(2) or (a)(3).
-94.806 Importation of partially complete engines: To allow for importation of engines that are not yet in their certified configuration, we are adding a reference to 40 CFR 1068.330. This includes certain limitations to prevent importers from abusing this provision.
-94.907 Engine dressing: Fix cross reference.
-94.912 Exemption for marine engines in land-based family: Make sure that the overview information in §94.904 references this new section.
-94.915 Staged-assembly exemption: As described in Chapter 1, we have added a new provision allowing manufacturers to assemble engines in different locations, provided that they maintain control of the engines at all times, and inform us that they are using this exemption. We may require that manufacturers take certain steps to ensure that engines end up in their certified configuration.
-94.1103 Engine repower: Fix paragraph numbering.

Chapter 4: Locomotives (40 CFR part 92)

Changes Being Adopted

We are making the following changes to 40 CFR part 92. A large number of these changes were proposed. One is a correction to update the reference to the appropriate test method. The remainder are being made in response to public comments. In most cases, the comment came from the Engine Manufacturers Association. See the text after the table for additional discussion of the public comments.

Regulatory Section	Description of Change	Proposed or Response to Comment
§92.1 (a) & (d)	Add paragraph (d) to clarify that subpart L applies to everyone.	Proposed
§92.2	Change "unique" to "specific" in definition of calibration.	Proposed
§92.2	Add to definition of locomotive an option to allow low power locomotives to be certified under part 92	Response to Comment
§92.2	Clarify that 750 hp limit applies to total combined power for multi-engine locomotives	Response to Comment
§92.2	Add "manufactured" to paragraph (5) of definition of new locomotive	Proposed
§92.2	Add "percent" to definition of repower	Proposed
§92.8(b)	Add allowance to measure crankcase emissions separately	Response to Comment
§92.104(b)(1)(i)	Add reference to speed and load "setpoints" and add 1.0 hp lower limit for load setpoint tolerance	Response to Comment
§92.105(d)	Delete separate voltmeter, ammeter, and wattmeter accuracy and precision specification	Response to Comment
§92.106(b)(1)(ii)	Relax torque accuracy requirements	Response to Comment
§92.109(c)(3)	Change reference for alcohol fuels to part 1065 subpart I	Correction
§92.114(a)(2)	Limit demonstration requirement to notch 8 operation	Response to Comment
§92.114(d)(2)	Allow lower backpressures	Proposed
§92.114(e)(1)	Change reference for "subpart N of part 86" to "40 CFR part 1065"	Proposed
§92.123 (a)(2)(i)	Move the word "only"	Response to Comment
§92.123 (a)(2)(ii)	Delete the word "not"	Proposed

Footnote 2 of Table B124-1	Allow shorter time in notch for smoke testing	Response to Comment
Table B124-1	Clarify that 15 minute maximum refers to time after lowest idle setting is reached	Proposed
§92.126 (b)(3)	Allow longer averaging times	Response to Comment
§92.131 (b)(3)	Allow option to average steady-state smoke measurements	Response to Comment
§92.132(d)	Correct equation: KH= [C1+C2exp((- .0143)(10.714))]/ [C1+C2exp((-0.0143)(1000H))]	Proposed
§92.203(d)(1)(i)	Correct reference from §92.208 to §92.204	Proposed
§92.204(a)	Clarify that separate families are required for freshly manufactured and remanufactured locomotives	Response to Comment
§92.205(a)&(e), §92.210(d)(2)&(#), §92.215(b)	Correct reference from "subpart" to "part"	Proposed
§92.208(a) and (b)	Change "in which" to "for which".	Proposed
§92.210	Make reference plural in paragraph (b)(1), and add paragraph (b)(2) to clarify that manufacturers making engine modifications within an engine family must show that the modified engines still meet emission standards.	Proposed
§92.212	Correct typo in (b)(2)(v)(G), replace "Locomotive" with "Engine" in (c)(2)(v)(A), correct the applicable manufacture date in (c)(2)(v)(D)(2), and clarify that manufacturers and remanufacturers may add a subheading to minimize mislabeling	Proposed and Response to Comment
§92.215(a)(2)(i)(A)	Correct typo in "process"	Proposed
§92.216	Delete paragraph (a)(2) to allow the Office of Air and Radiation to represent itself at hearings.	Proposed
§92.403(b)	Change "effect" to "affect"	Response to Comment
§92.508(e) and §92.511(g)	Change 30 days to 45 days	Response to Comment
§92.512(e)	Delete "is made"	Proposed
§92.806	Add section to apply 40 CFR 1068.330	Response to Comment
§92.906(a)	Delete "as defined in §92.2".	Proposed

§92.907(a)(3) and (b)(3)	Increase sales limits	Response to Comment
§92.912	Add a new provision allowing manufacturers to assemble engines in different locations, as described in Chapter 1.	Response to Comment
§92.1106(a)	Correct the penalty for tampering to be based on each engine in violation, as opposed to each engine and each day.	Proposed
Appendix IV to part 92	Correct "13-mode" to "10-mode"	Proposed

Public Comments

Definition of Locomotives and Hybrids

By definition, the standards for locomotive engines currently do not apply to engines used in locomotives if the locomotive has a maximum power below 750 kW. These engines are generally designed and manufactured for other applications, so they were excluded from locomotive standards and procedures. Prior to the proposal, we received a request to allow engines below 750 kW that are used in locomotives to optionally certify to locomotive standards instead of the otherwise applicable requirements of 40 CFR part 89, and we requested comment regarding this issue and the related issue of hybrid locomotives.[7]

We are finalizing a provision that will allow manufacturers to certify locomotives that have total power less than 750kW. This provision will allow manufacturers of hybrid locomotives to certify under 40 CFR part 92. EMA commented that if we do this, we should specify test procedures and duty-cycle weightings for such hybrids. We agree that this would be appropriate in the long term, but do not believe that this rulemaking would be the proper place for such provisions. Instead, we expect to rely the testing and calculation flexibility of §92.207 and §92.132(e) to certify hybrids on a case-by-case basis in order to meet the stated goal of §92.103 to measure emissions "in a manner representative of a typical operating cycle." A manufacturer seeking a certificate for a hybrid should first identify the typical operating cycle for the locomotive. EPA would then determine the typical operating modes to be tested and how to weight them to be representative of a typical operating cycle.

This flexibility would not allow EPA to account for the lower engine horsepower needed with hybrids to provide equivalent tractive horsepower. While we agree in concept that such adjustment may be appropriate, the existing flexibility does not allow for them and we believe it would be beyond the scope of this rule to revise the regulations to allow for such adjustments. These regulatory changes would more properly be considered in a rulemaking more focused on issues of emission standard stringency.

[7]"Inclusion of the Railpower Green Goat Hybrid Locomotive 40 CFR 92 Averaging, Trading, and Banking" e-mail from Christopher Weaver, Railpower, May 7, 2004 (Docket #OAR-2004-0017-0003).

Definition of Remanufacture

The existing definition says that "remanufacture means to replace, or inspect and qualify, each and every power assembly of a locomotive or locomotive engine, whether during a single maintenance event or cumulatively within a five year period." EMA asked that remanufacturers be allowed to limit the practice of "inspecting and qualifying" (i.e., not replacing every power assembly with remanufactured power assemblies at the time of engine remanufacture). However, remanufacturers already can limit this practice. Therefore we do not need to make any changes to the regulations in response to this comment.

More importantly, the remanufacturer is actually *expected* to maintain this kind of control over the remanufacturing process. By allowing an engine to be remanufactured under its certificate, the remanufacturer is assuming responsibility for the emission performance of that remanufactured engine. As such, it should take whatever steps are necessary to ensure that the remanufactured locomotive is identical to the locomotive described in the application for certification. Remanufacturers should allow inspecting and qualifying power assemblies only in those cases in which they can be certain that the previously used power assembly will not cause an engine to exceed an emission standard. The remanufacturer might also limit the certificate to only those engines remanufactured by installers that been properly trained.

While certificate holders have responsibility for the emission performance of locomotives remanufactured under their certificates, §92.209 also assigns responsibility to others involved in the remanufacturing process. In practice, EPA will generally try to require remedial action for in-use noncompliance from the persons who caused the problem.

Fuel Flow Measurements

The regulations specify one-minute or lower averaging times for continuous fuel flow measurements. EMA ask to allow longer averaging times. We agree that longer averaging time may be appropriate. Revised section 92.126(b)(3) states:

> Sampling periods greater than one minute are allowed, consistent with good engineering practice. Fuel flow averaging periods should generally match the emission sampling periods as closely as is practicable.

Assuming that actual fuel flow rates are constant in each notch, longer averaging times should be consistent with "good engineering practice". However, if the fuel flow rate varies with time, then the averaging period should be such that it best represents the amount of fuel consumed during the same period over which emissions are being averaged.

Test Fuel

EMA asked that EPA lower the required sulfur content of locomotive and marine diesel test fuel to be limited to 500 ppm, consistent with the upcoming change to the in-use fuel. However, such a

change would have the effect of relaxing the existing PM standards. We believe that any change to the test fuel specifications must be made in conjunction with a revision to the Tier 0, 1,and 2 PM emission standards.

Test Conditions

EMA commented that testing should be limited to temperatures between 45°F and 105°F, and EPA eliminate the option for manufacturers/remanufacturers to test at higher temperatures without correction. However, we see no harm in allowing manufacturers/remanufacturers the option of testing at higher temperatures. Given the size of locomotives, outdoor testing can be more practical than indoor testing in some cases, and in some regions of the country, temperature spikes above 105°F will occur. This option allows manufacturers/remanufacturers to use higher temperature test data instead of retesting. It is also important to note that EPA does not have this option, and thus, this option does not create any risk to manufacturers/remanufacturers.

Smoke Testing

The previous regulations define the steady-state smoke emission rates as the highest reading occurring more than two minutes after the notch change (excluding peaks lasting less than 5 seconds, caused by such random events as the cycling of an air compressor). EMA commented that steady-state smoke emission rate should instead be an average value. The existing regulations were intended to allow the steady-state value to be easily read from a strip chart recorder without mathematical manipulation. Peaks caused by the cycling of an air compressor can be readily ignored using this approach, and the highest non-peak value can be readily identified. We still believe that this is the best approach for reading strip chart smoke traces. However, we agree that this is not the best approach for digitally recorded smoke measurements. Mathematical averaging is simple with digitally recorded data, but identifying compressor peaks can be more complicated. Thus, we are revising §92.131(b)(3) to allow manufacturers the option to use the average value including peaks. Using the average value instead of the highest value would lower the smoke value for digital data, while including the compressor peaks would raise the value. We believe that the combination of these two effects would result in no net change in the stringency of the steady-state smoke standard.

NOx Correction

Section 92.132(e) allows for the use of calculations other than those listed in the regulations. EMA suggested in its comments the following specific criteria for the approval of alternative correction equations:

(a) The manufacturer will define the ambient temperature and humidity range for which their developed NOx correction factor will apply.
(b) (1) Temperature and humidity effects on NOx concentration in the engine exhaust must be evaluated at a minimum of 3 points across the defined temperature and defined humidity range.
(2) The manufacturer will be required to measure NOx emissions, for each temperature/humidity matrix point, at a minimum of three engine notch or power settings as follows -

- full load
- intermediate load
- idle

(c) The alternative correction factor must adjust to standard ambient conditions of 86°F for temperature and humidity of 75 grains moisture per pound of dry air for locomotive engine operations.
(d) Test variability should be minimized, to the extent possible, for other parameters that are not directly relevant to the investigation of the effects on NOx emissions that result from changes in ambient temperature and humidity.
(e) All test data and calculations used in the development of the manufacturer's alternative correction factor will be submitted to EPA for review and approval.
(f) EPA will review manufacturers' submissions and grant or deny approval within 90 calendar days of receipt of the request by EPA.

While we believe that these criteria would *generally* be appropriate, we are not incorporating these specifications into the regulations at this time. We agree completely with paragraphs (c), (d), and (e) of EMA's recommendation, but see EMA's recommendation of the number of data points required in paragraph (b) as a minimum number. Good engineering practice would obviously require additional points where test-to-test variability is significant or where the fit of the data is not linear. We agree with EMA's paragraph (a), with the clarification that EMA means that corrections cannot be used outside of the range of data. For example, if the lowest temperature tested to develop the correction factor is 60°F, then the correction cannot be used for testing below 60°F. Finally, given the potential complexity involve in NOx correction factors, we cannot agree to always approve or deny approval within 90 days. Nevertheless, we will attempt to complete the approval process as quickly as possible.

Use of Nonroad Engines

Section 92.907 allows the use of a limited number of nonroad engines in locomotive applications without certifying under the locomotive program. Cummins requested that EPA lift the restrictions on the number of nonroad-certified engines that may be used in locomotive applications, and asked for a clarification of EPA's justification for the limits. We have limits on the number of nonroad engines that can be used for four primary reasons:

1) The locomotive program is uniquely tailored to the railroad industry to ensure emission reductions for actual locomotive operation over 30-40 year service lives.
2) At sufficiently high sales levels, the per locomotive cost of certifying under part 92 become less significant.
3) It is somewhat unfair to allow nonroad engine manufacturers the option of certifying the engines in whichever program they believe to be more advantageous to them, considering factors such as compliance testing requirements.
4) States and localities have much less ability to regulate locomotives than other engine types, and thus EPA has an obligation to monitor locomotive performance more closely.

We believe that these reasons remain valid. Nevertheless, we have reconsidered the sales limits and are adjusting them upward. We now believe there may be cases in which the use of nonroad-certified will provide very significant additional emission reductions beyond the locomotive program. In these cases we would like to have the ability to allow slightly higher numbers. However, under the revised regulations, we will still retain the right to deny such exemptions because of "adverse environmental or economic impacts."

Cummins also asked that EPA clarify that the use of nonroad certified engines is applicable to both new and remanufactured locomotives. We believe that the regulations are already clear that §92.907(a) applies to repowering existing (i.e., remanufactured) locomotives and §92.907(b) applies to freshly manufactured switch locomotives.

Offer for Sale

EMA asked that EPA not use the term "offer for sale" in the prohibited acts (40 CFR 92.1103). They are concerned that this would be problematic because locomotives are generally manufactured only after a sales agreement has been completed. The manufacturer offers to manufacture and sell a locomotive at least several months before it actually has obtained a certificate of conformity for the locomotive. However, the phrase "offer to sell" does not apply to products that have not yet been manufactured (or remanufactured, as applicable). It is used in the Clean Air Act and in many other EPA rules and has not caused problems in the past.

Repowering and Replacement Engines

EMA asked that EPA exempt replacement engines as we do in other nonroad engine programs. However, such exemption is not necessary with locomotives. Long after the manufacturer has stopped manufacturing brand new engines, that manufacturer (along with other remanufacturers) will be certifying remanufacturing systems, and remanufactured engines will likely be available. Thus, we believe that the cases in which a brand new engine will be needed will be rare. Nevertheless, we are finalizing a regulatory change in 40 CFR 92.204 to explicitly allow manufacturers to include freshly manufactured locomotive engines in the same engine family as remanufactured locomotives. In some cases, all of the parts of a truly remanufactured engine are brand new except for the engines block. We do not see why the engine should be treated differently merely because it also has a new block. Thus, under the revised regulations, manufacturers will be allowed to include entirely new engines in their remanufactured engine family, provide the engine is identical to those described in the application. We believe that this will resolve the issue, since manufacturers would merely need to certify a remanufacturing system for each engine it manufactures.

Labeling

EMA commented that EPA should make the locomotive and engine label identical to avoid mislabeling. However, these labels serve very different purposes. The locomotive label defines the standards and/or FELs to which the locomotive is initially certified and that will thus apply to engines used later in that locomotive. It is worth clarifying that §92.212(b)(1) requires that the locomotive

label be applied only when a locomotive is originally manufactured (or originally remanufactured as a Tier 0 locomotive) or when a remanufacturer chooses to certify the locomotive to a different FEL than it was originally certified. Thus mislabeling should not be a long term problem. Nevertheless, we are adding an interim provision to the regulations that will allow manufacturers to use identical engine and locomotive labels for Tier 0 locomotives, provided they demonstrate to us that they will not supply two labels in kits for locomotives that have already been labeled during a previous remanufacture. This will prevent the availability of "extra" labels that could be fraudulently used to make uncertified engines appear to be in compliance with the standards.

Other issues

There are several other minor changes that we are making in response to comment that are worth discussing very briefly. Several of the comments requested simplifications of the test procedures. We determined that these changes will not compromise test accuracy and are adopting them. More specifically, we are revising §92.8(b) to allow crankcase emissions to be measured in the same way as other nonroad engines. We are revising §92.104(b)(1)(i) and §92.106(b)(1)(ii) to address problems that can occur at very low power levels or very low torque levels. We are revising §92.114(a)(2) and footnote 2 of Table B124-1 to eliminate unnecessary test burdens.

Under the previous regulations manufacturers were required to submit production-line testing reports within 30 days of the end of each quarter. Manufacturers noted that occasionally new information would become available a few days after the deadline. We decided that it is better to allow the manufacturers 15 additional days to ensure that their reports are complete.

Finally, we are adding §92.806. This change is being made to be consistent with other nonroad programs.

Chapter 5: Small nonroad spark-ignition engines (40 CFR part 90)

I. Summary and Analysis of Comments

We received comments on some of the proposed provisions, with additional comments raising new issues for us to consider. The following discussion presents a summary and analysis of all these comments. Section II identifies the changes included in the proposal, with a brief rationale for each of those changes.

Issue	Response
90.612: EMA recommended changing the exemption allowing an owner to import a nonroad engine solely for the purpose of repair or alteration. The change would align with the similar provisions for locomotive and marine diesel engines. This would generally allow engine operation for such engines as needed for transportation to facilitate repairs.	Nonroad equipment generally does not need to travel under its own power for long distances to arrive at a repair facility. However, we agree that the equipment may need to be operated, for example, to drive up onto a trailer. We don't believe expanding the exemption will lead to abuse, and have changed the regulation accordingly..
90.3: EMA and Briggs recommended keeping the current definition of gross power, which gives manufacturers the discretion to pick the appropriate value.	We did not propose to make a change, but requested comment on the concept of revising power definitions for determining whether an engine should be subject to part 90, which hinges on whether an engine is above or below 19 kW (or 30 kW if displacement is at or below 1000 cc). For current engine designs, the displacement threshold seems to be more of a determining factor than the power. We therefore believe it is best to address this concern in the upcoming rulemaking to set new standards for these engines. However, the relationship of part 90 to parts 1048 and 1051depend on common definitions. These other parts use the term maximum engine power, so we are making the nonsubstantive change to add a definition for maximum engine power based on the existing definition in 90.3 for gross power.
90.615: Manufacturers have expressed a need for an exemption that would allow them to import engines that are covered by a certificate, but are not yet in their certified configuration. Final assembly is planned inside the United States.	We are including in the final rule a cross reference in part 90 to 40 CFR 1068.330, which was designed for this situation.
EMA and Briggs suggested to initiate a task force before applying part 1065 to Small SI, since it is geared toward testing diesel engines.	The testing regulations in part 1065 were initially developed for recreational and industrial applications of spark-ignition engines, so we believe it will require only minor modifications before applying to small consumer engines. Manufacturers are encouraged to raise any specific concerns with the test procedures in part 1065, either before or after we propose to apply them to Small SI engines. In meetings with engine manufacturers, we have started the process of reviewing test procedures to ensure that we adopt appropriate provisions for Small SI engines.

90.120: Southwest Research Institute and EMA requested clarification that updating the test-procedure references from part 86 to part 1065 aren't intended to require lab upgrades.	The references introduced in part 89 are intended only to facilitate the migration of specified test procedures for heavy-duty highway engines from part 86, subpart N, to part 1065. Most of these references point to background information or optional systems. There is no intent to require new equipment or revised procedures as a result of these changed references. To ensure that this is the case, we are adding a provision in §90.120 stating that any of the references to part 1065 may be taken from part 86 as a pre-approved alternative procedure.
90.119(a)(1)(i). EMA suggested that EPA allow rated and intermediate speed engines in the same family and base the certification of that family on the worst case engine/test cycle combination. Production line audit or SEA audit tests for individual engines should be based on the intended use of the engine.	We agree that this makes sense for the main difference between these engines is the governor specification. Industry will make a fair determination of worst case for certification.
90.312(c)(2). EMA requested that we allow either zero air or nitrogen to calibrate all analyzers for raw-gas measurements.	We believe this change is not appropriate, since some analyzers respond differently to zero air and nitrogen. We believe it is appropriate to leave §90.312 unchanged for Phase 2 engines and address the broader issue of calibration procedures to part 1065 (in the context of the upcoming Phase 3 rulemaking), which takes a substantially different approach.
90.324. EMA requested that we not require pressure-side leak checks, since they do not affect measured results.	We agree with this comment and have revised the regulations accordingly.
90.324(a)(3) and 90.409(c)(6). EMA noted the need to correct certain references.	We agree with this comment and have revised the regulations accordingly.
90.326. EMA requested that we change the regulations to no longer require calibration using all of an analyzer's ranges, but rather, to require this only for the ranges used during testing.	We believe the regulations do not require calibration using ranges that are not used during testing, but we have modified the language to make this clearer.
90.426(a). EMA requested omitting the requirement to submit CO2 emission levels for certification.	Manufacturers must measure CO2 to calculate final emission results. It is important to report CO2 emission levels as a way of verifying proper calculations.
90.405(d)(10). EMA requested that we not require measurement and reporting of fuel inlet pressure.	We agree with this comment and have revised the regulations accordingly.
90.408(b)(2). EMA recommended that we allow manufacturers to assess the influence of the sample collection o fuel flow and torque after testing.	We agree that this verification can be done independently of testing. In fact, measurement technologies have developed substantially since these regulations were originally drafted. We are therefore adopting a revised provision related to fuel-flow and torque affects to base the verification on good engineering judgment, with a variety of suggested practices.
90.417(a), 90.419(e), and 90.426(g). EMA requested that we remove the requirement to measure and report brake-specific fuel consumption, since it is unrelated to showing that engines meet emission standards.	We agree with this comment and have revised the regulations accordingly.

90.417(b). EMA requested that we change the requirement to control fuel flow measurements to within 1 percent of full scale, by revising this specification to 2 percent of full scale for non-idle modes . This points out that the provision in this paragraph is inconsistent with the table of values in the appendix to this subpart.	We disagree with this comment. The table of values, in Appendix to subpart D, specifies a different allowance for fuel-measurement variability, but this relates to a system measurement, rather than some specification for the fuel-flow measurement specifically. Variations up to 2 percent of full scale would allow too much variability for this measurement. For part 1065, we are moving in the direction of reducing the variability in this measurement.
90.418. EMA requested that we decrease the minimum sampling time from four minutes to two minutes.	We agree with this comment and have revised the regulations accordingly.
90.419(b) and (c), and 90.426(e) and (f). EMA recommended changing the humidity correction for NOx emissions to follow the provisions proposed for part 1065, which involves a linear correction.	We agree with this comment and have revised the regulations accordingly.
90.706: Manufacturers pointed out that the equation for determining sample sizes for production-line testing should be corrected to match the similar equations from other regulatory parts.	We agree that the equation was published with the exponent in the wrong place and have revised the regulations to correct this.

In addition to these comments, we have identified a need to revise the proposed language for §90.421. This section included a variety of references in paragraph (b)(4)(ii) to part 1065. While it is appropriate to change any existing part 86 references to point to part 1065, we mistakenly changed some part 90 references to point to part 1065. We are therefore removing these subparagraphs from the regulatory language in this rulemaking to keep the existing regulations and references unchanged for those provisions.

II. Summary of Rulemaking Changes

We proposed the following changes part 90:

- Add a new §90.913 to better define the responsibilities for manufacturers choosing to certify their engines below 19 kW to the emission standards for Large SI engines in 40 CFR part 1048.
- Revise §90.1 to cross-reference provisions in parts 86, 1048, and 1051 that allow highway motorcycle engines and nonroad engines above 19 kW to meet the requirements in part 90 under certain conditions.
- Update current references to test procedures in 40 CFR part 86 by pointing instead to 40 CFR part 1065.

Chapter 6: Large nonroad spark-ignition engines (40 CFR part 1048)

I. Summary and Analysis of Comments

We received comments on some of the proposed provisions in part 1048, with additional comments raising new issues for us to consider. The following discussion presents a summary and analysis of all these comments. Section II identifies the changes included in the proposal, with a brief rationale for each of those changes.

Issue	Response
1048.205: Impco responded to the proposed changes in the application for certification, noting that the detailed specifications describing auxiliary emission-control devices will take an additional 10-20 hours longer for each family, with no benefit.	While the regulations call for a long list of parameters and other information, much of this defaults to a simple description for Large SI engines. We are not interested in seeing a great level of detail for these engines, since their emission-control systems generally use well established technologies to maintain proper engine operation.
1048.120(e): NACCO noted that updating warranty statement annually in the owners manual is a big burden. Also, there is no single document that serves as the owners manual, but rather a collection of operator manuals, maintenance and service manuals, and warranty manuals.	The warranty information generally does not change from year to year, so adding the warranty information to the owners manual should be a one-time effort. Also, we have revised the regulations in §1048.801 to include a definition of owners manual to include a collection of documents for the operator.
1048.135: NACCO commented that we should not require the emission standard to be printed on the label. It is not clear whether the label should include individual emission results, worst-case emissions, or something else. Emission numbers aren't useful to the operator.	The regulations clearly state that the applicable emission standards need to be on the label, not any test results. This information will only change over time if the manufacturer chooses to certify Tier 2 engines to a different point on the curve of HC+NOx vs. CO standards. It is important for the emission standard to be on the label, for example, for EPA officials to determine whether the engine meets applicable requirements (especially for Tier 2). It will also facilitate the purchaser's ability to choose engines with HC+NOx vs. CO tradeoffs that the purchaser believes is appropriate for the engine's intended use.
1048.101(g): Wisconsin Motors responded to our request for comment related to the useful life for severe-duty engines, pointing out that it is clear severe-duty engines need shorter useful life and that we should adopt a shorter useful life for these engines in the regulation so that they don't have to go through an administrative process to demonstrate some alternate useful life.	We agree that severe-duty engines should be expected to have a shorter useful life and that manufacturers should have some certainty in the early design stages regarding the targets for making durable emission controls. Accordingly, we believe it is appropriate to revise §1048.101 to include a useful life of 1500 hours for severe-duty engines, which is the period recommended by Wisconsin in in their comments on the November 2002 final rule.

1065.514: Wisconsin Motors emphasized that it is important to keep the provisions in part 1065 allowing relaxed values for cycle validation if that is necessary for a particular engine system.	We are adopting these provisions as proposed.
1048.501: Wisconsin Motors commented that they would like to use raw-gas sampling for their certification measurements. They noted that the difference between dilute and raw-gas methods is less than 1 percent.	We believe the improved procedures for raw sampling specified in the proposed changes in part 1065 are adequate to ensure sufficiently accurate results from raw sampling systems. Current raw sampling systems may need upgrades to meet the new requirements, but any raw sampling system that can meet applicable specifications is acceptable for valid measurements. We are therefore removing from §1048.501 the requirement to use only dilute sampling procedures.
1048.115(a): The Motorcycle Industry Council commented for recreational vehicles that the requirement related to controlling crankcase emissions should be limited to the useful life.	We agree with this comment and have changed the regulations to limit the responsibility for controlling crankcase controls to the engine's useful life.
1048.135(f): The Motorcycle Industry Council commented for recreational vehicles that the regulations should clarify that duplicate labels are needed only if the original label is not visible "during normal maintenance."	We agree with this comment and have changed the regulations as recommended.
1048.210: The Motorcycle Industry Council commented for recreational vehicles that the provisions for preliminary approvals should be revised to add assurance that EPA won't reverse a decision without establishing that the manufacturer intentionally used false information in its request or that the preliminary approval would lead to noncompliance.	We agree with this comment and have added language to 1048.210 specifying that we will not reverse a decision granted as preliminary approval without new information.
1048.110 and 1048.115: Nissan raised issues or questions related to the diagnostic and broadcasting requirements. (1) The regulatory language may inappropriately prevent a particular configuration. (2) The specified diagnostic codes don't address items specific to LPG-fueled engines.	(1) We agree that the regulatory language needs adjustment to address the variety of systems manufacturers may use, primarily to allow manufacturers to broadcast speed values (not just torque values) to a remote device instead of broadcasting to the engine's controller area network. (2) 1048.110(g) already considers the need to use codes that are different than ISO, subject to EPA approval. We will consider whether it might be possible to move in the direction of normalizing codes for common configurations.
1048.310: ECO LLC commented that the proposed change requiring a minimum of eight production-line tests annually was overly burdensome for very small engine families.	We agree with the comment and have modified the regulations, as described below.

1048.101: We asked for comment regarding adjustments that might be needed to allow for testing high-speed engines over the transient duty cycle, since denormalizing the published duty cycle for these engines can result in unrealistic acceleration rates. Polaris noted generally that the transient test was one of the reasons they thought the standards of part 1048 should not apply to high-speed offroad utility vehicles over 30 kW.	While we believe that the particular vehicles and engines in question should still be subject to the standards in part 1048, we believe the best approach to addressing the testing concerns is to waive the requirement for transient testing for engines with maximum test speed over 3400 rpm. This would apply to applications that are more like recreational products without changing the current requirements for industrial engines, which are generally governed for maximum speeds of 2800 or 3000 rpm.
1048.245: Nissan pointed out that Underwriters Laboratories (UL) has interpreted their requirements to provide for manufacturers to design their gasoline tanks to allow venting under vacuum pressures short of the specified level of 1.5 psi for those products that are subject to the applicable requirements under the UL558 standard. These changes make the EPA specification inconsistent with that of UL.	Our specification of 1.5 psi for design-based certification was intended simply to match UL, with the expectation that the existing specification established the feasibility of such a system. A much less challenging specification would be appropriate for EPA's purpose of ensuring sealed fuel tanks to control vapor losses during daily temperature swings, since those emissions are driven by a positive pressure. We are therefore changing the specification in §1048.245(e)(1) to require sealed fuel tanks for vacuum pressures up to 0.1 psi gauge pressure.
1048.620: Cummins commented that we should consider diesel-derived natural gas engines to be diesel engines for emission regulations. This could be done by expanding the scope of 40 CFR part 89 and 1039, or by revising the provisions of §1048.620 to (1) include LPG-fueled engines, (2) include engines below 250 kW, (3) allow the use of highway-certified engines in nonroad applications without recertifying. This approach would harmonize with EPA's treatment of highway engines and with California ARB's treatment of nonroad engines. This is appropriate considering consumer demands for performance, duty cycles, and operating characteristics.	While we requested comment on changing the definition for spark-ignition engines, a broad change to the definition as suggested in the comment would require considerable coordination with the public that would need to be addressed with full notice and comment. The individual changes suggested can be considered separately, as follows: (1) We agree that it is appropriate to include LPG-fueled engines under §1048.620. Since natural gas is the dominant alternative fuel for these engines, we simply did not contemplate applying this provision to LPG-fueled engines. (2) We believe it would be necessary to address the concern for engines below 250 kW in a separate rulemaking, since this change could adversely affect other companies that have expressed a concern about making small natural gas engines subject to standards for diesel engines. (3) The provisions of §1048.605 and §1048.610 already allow for using certified highway engines in nonroad applications without recertifying.

In addition to these comments, we have identified a variety of additional minor changes and adjustments to include in the final rule. There are a variety of changes simply to correct typographical, grammatical, and nomenclature errors. In addition, these changes include:

- Removing the specification in §1048.115 to require the capability to sample exhaust emissions from production vehicles. This is adequately addressed in §1048.205.
- Specifying in §1048.205(aa) that manufacturers must name an agent for service of process in the United States. This puts into the regulations a well established expectation to identify a person in the United States who can represent the company for official business.

- Moving the provisions related to stabilizing test engines within 50 hours of engine operating time from 40 CFR part 1065 to §1048.501. This allows us to change the default stabilization time in part 1065 to 12 hours. This change does not affect the requirements for Large SI engines.
- Keeping the maximum run time and sampling time in each mode only for lean-burn engines that use NOx aftertreatment (§1048.505(a)(1)). Specifying maximum values is important for appropriately measuring emissions from lean-burn engines, but this is not necessary for the more common stoichimetric engines, even if they use NOx aftertreatment.
- Clarifying the provisions of §§1048.605 and 1048.610. This includes a correction to remove a reference to compression-ignition engines, since this part is applicable to spark-ignition engines. We also clarify that engines for highway motorcycles are not covered by these provisions, since that was not intended and this would not be appropriate, given the relative stringency of the applicable emission standards. Finally, we revised the language in several places to more clearly address the situation for nonroad equipment manufacturers installing certified highway engines.
- Adding a reference in §1048.510(c) to identify the appropriate duty cycles as those that we specify in Appendix I or Appendix II of part 1048.
- Changing §1048.125(f) to specify that engine manufacturers must not condition warranty on specific individuals or companies providing engine service, as opposed to providing service for the equipment. The equipment manufacturer, not the engine manufacturer, would generally be in a position to prescribe maintenance for the equipment. Also, the warranty applies to the engine, so this change is appropriate.
- Adding clarifying language in §1048.501 and §1048.801 to reflect the adjusted engine-mapping procedure in part 1065 for constant-speed engines.
- As described in the preamble, we believe it is appropriate in response to a comment from another category to remove the requirement to apply the emission-related warranty to components that are covered by a service contract purchased by the consumer, where the emission-related warranty was required to correspond with the service contract (or extended warranty). We have changed 1048.120(b) accordingly.

II. Summary of Rulemaking Changes

We adopted emission standards for Large SI engines in November 2002 (67 FR 68242). The regulations in 40 CFR part 1048 were our first attempt to draft emission-control regulations in plain-language format. In the recent final rule for nonroad diesel engines, we went through a similar process, including extensive interaction with a different set of manufacturers. This process led us to adopt regulatory provisions in 40 CFR part 1039 that differ from those in part 1048. Since the process of meeting standards, applying for certificates, and complying with other emission-related requirements has a lot of commonality across programs, we have a strong interest in adopting consistent provisions and uniform terminology as much as possible. As a result, we are making extensive changes in part 1048 to align with the regulations in part 1039.

Many of the changes for part 1048 involve relatively minor wording differences. Several other changes involve new or revised language to express a regulatory provision more clearly without

changing the underlying policy. There are also some minor organizational changes to move certain provisions to a different location that better reflects their relationship to the overall process of certifying engines. We believe it is important to make these changes to avoid a situation where we unintentionally apply slightly different provisions to different categories of engines. These changes that are intended to involve no change in policy are not listed here.[8]

The following tables highlight many of the specific changes to part 1048.

Subpart A—Overview and Applicability

Reference	Proposed Change
1048.1	We now state that the part 1048 requirements apply to Large SI engines, rather than to the manufacturers of Large SI engines.
1048.5	We no longer state that aircraft engines are excluded from emission standards under 40 CFR part 1048, since we have changed the definition of nonroad engine to clarify that aircraft are not considered nonroad engines.

Subpart B—Emission Standards and Related Requirements

Reference	Proposed Change
1048.101(a)	In the November 2002 final rule, we excluded engines above 560 kW from transient emission standards on an interim basis, primarily to defer this decision to the rulemaking for nonroad diesel engines. Consistent with that rulemaking, we are affirming this decision as a long-term provision and are accordingly moving it from 1048.145 to 1048.101. These engines must still design for controlling transient emissions, but are not subject to the transient emission standards (see 1048.205).
1048.101(g)	The provision for a shorter useful life now includes provisions to clarify how a manufacturer can select and support some alternate useful life period. We also identify this as a shorter useful life in operating hours, not in years. Note that we are defining a fixed useful-life period for severe-duty engines, as described in Section I above.
1048.105	We are exempting marine auxiliary engines from the evaporative emission standards, since we are separately pursuing evaporative controls for marine systems, which will eventually extend to fuel systems for both propulsion and auxiliary engines.
1048.115(a)	Provisions related to controlling crankcase emissions more carefully explain how to account for crankcase emissions in those cases where manufacturers add crankcase emissions to measured exhaust emissions.
1048.115(g)	The prohibition regarding defeat devices originally specified that an emission-control strategy that is active during testing over the specific duty cycles will not be considered a defeat device. We have expanded that to include field-testing operation by excluding operation that occurs during all testing under the procedures of Part 1048, Subpart F.

[8] See "Redline Version of 40 CFR Part 1048 Showing Proposed Changes," EPA memo from Alan Stout to Docket OAR-2004-0017, July 5, 2004.

1048.120(a)	The scope of the warranty now explicitly includes secondary purchasers to make clear that the emission-related warranty is fully transferrable throughout the specified warranty period. Also, the scope of the warranty includes the engine and all its emission-related components.
1048.120(b)	Warranty periods are clarified: (1) If mechanical warranties are offered without charge, the emission-related warranty for the corresponding components (or the whole engine, as applicable) may not be shorter than the mechanical warranty. (2) If manufacturers offer an extended warranty for an extra charge, the emission-related warranty may not be shorter than that, but only for those particular engines. (3) We clarify that the warranty period starts when the engine is first placed into service.
1048.120(c)	We clarify that the warranty includes components such as catalysts that are manufactured by another company, even if the component is shipped separately and the certifying manufacturer never takes possession of those components.
1048.120(e)	We add a requirement for manufacturers to describe the emission-related warranty provisions that apply to their engines in the owners manual.
1048.125(c)	The rule originally allowed for extra maintenance for special situations. We are clarifying this to point out that manufacturers must make clear to the operator that this additional maintenance is tied to some special situation.
1048.125(g)	This provision was originally adopted as §1048.120(d). We have modified this to more carefully track provisions in the Clean Air Act. In particular, this provision now clarifies that owners must generally pay for scheduled maintenance, with an exception for relatively expensive parts that have been added to meet emission standards and that are not needed for proper engine performance.
1048.125(h)	Consistent with §1048.125(g), we now require manufacturers to communicate the owner's obligations to properly maintain their engines.
1048.130(d)	We have added a provision allowing manufacturers to communicate installation instructions to engine installers other than sending a copy of the instructions along with each engine. Manufacturers may describe in their application for certification that they, for example, post their installation instructions on a publicly available web site.
1048.135(c)	We have modified the requirements for the emission control information label: (1) We now allow manufacturers to apply the corporate name and trademark from another company, (2) The manufacturing date need not be on the label, as long as the manufacturer keeps records that allow us to find out the manufacturing date, (3) The maintenance specifications may be omitted from the label if there is not enough room on the label and the information is instead printed in the owners manual. (4) Useful life must be included only if it is different than the default value specified in §1048.101(g).
1048.135(d)	We are adding a provision to specifically allow manufacturers to include additional label information related to meeting other emission standards, or properly maintaining engines.
1048.135(g)	We are adding a requirement for engine manufacturers to supply duplicate labels to equipment manufacturers that need them and to keep basic records to document the transactions. We have already adopted corresponding limits on what equipment manufacturers must do to properly apply these duplicate labels and prevent abuse, such as proliferation of counterfeit labels.

1048.139	We are adding a new section that describes more precisely how to determine maximum engine power. This applies to any provision in the regulations that relates to engine power, such as the applicability to engines above 19 kW. Maximum engine power values also serve to define a unique engine configuration (within normal production tolerances). If manufacturers want to include engines with different values for maximum engine power in an engine family, they would treat those as separate engine configurations.
1048.140	We are adding a new set of voluntary emission standards that allow a manufacturer to qualify for the Blue Sky designation. Some manufacturers have expressed an interest in using automotive engines in nonroad applications. The additional voluntary standards are intended to more closely reflect the emission-control potential of a modern automotive engine (light-duty or heavy-duty) when produced for nonroad applications. We are also interested in aligning our voluntary standards with those under consideration by the California Air Resources Board. The final rule therefore includes adjusted levels of voluntary standards, consistent with ongoing regulatory developments in California.
1048.145(a)	We are clarifying the provisions related to family banking. For example, we are adding a requirement that manufacturers start producing early engines by September 1, 2006 to reduce the compliance burden in 2007. This prevents manufacturers from reducing their burden by producing engines marginally earlier than is required under the Tier 2 standards. Once a manufacturer qualifies, all the engines produced before January 1, 2007 count toward reducing the Tier 2 compliance burden. We also clarify that the "late" engines need to continue to be certified to Tier 1 emission standards, with all the associated requirements. Finally, we require manufacturers opting into family banking to report at the end of each year how many "early" or "late" engines they produced in the preceding year.

Subpart C—Certifying Engine Families

Reference	Proposed Change
1048.201(g)	We are including a clearer statement that we may require manufacturers to deliver test engines to a particular facility for our testing.
1048.205(a)	We are clarifying the direction to describe emission-control systems to require that manufacturers identify each unique configuration.
1048.205(b)	We are adding a clarifying note to include part numbers for emission-related components. This information, which is already commonly included in applications, helps us to manage the information related to the certified configuration, especially as it relates to running changes in an engine family.
1048.205(b)(11)	The instructions for completing the certification application now include detailed items related to auxiliary emission-control devices. This clarifies the manufacturers' existing responsibility to describe their emission-control systems.
1048.205(r)	Consistent with the Tier 4 final rule for nonroad diesel engines, we require manufacturers of engines above 560 kW to show how they control transient emissions. This gives us an opportunity in the certification process to ensure that engines are designed with control strategies that are similar to those for smaller engines and to ensure that engines have no defeat devices.
1048.205(t)	In addition to the existing requirement to describe adjustable parameters, we are including a requirement to describe how the adjustment limits are effective in preventing operators from making inappropriate adjustments.

1048.250(b)	We are adding a requirement to keep records related to production figures by separate assembly plants and lists of engine identification numbers in each engine family.

Subpart D— Production-line Testing

1048.310(g)	Clarify the maximum testing rate of 1 percent for production-line testing for small-volume families. We modified this provision in response to a comment received. The maximum testing rate is scaled according to projected sales volumes to allow for testing less than 1 percent of production for small-volume production.

Subpart F—Test Procedures

Reference	Proposed Change
1048.501(a)	We are allowing testing with partial-flow dilute sampling. This approach is generally used for larger diesel engines, but some laboratories may also be set up to use partial-flow sampling for Large SI engines.
1048.501(a)	We no longer specify that testing must include measurement of CO_2 emissions. However, if manufacturers use equipment and procedures that require measurement of CO_2 emissions, then this information must be included in the application for certification (see §1048.205).
1048.505	We adopted conventional duty cycles and procedures for steady-state testing in the November 2002 final rule. We are supplementing these procedures with an option to test engines using a different kind of steady-state testing. Ramped modal cycles incorporate the same testing modes (in engine speed and load) into a single, continuous sampling period that involves gradual ramps to transition from one mode to the next. See the related supporting document for additional explanation of the development of ramped-modal testing.[9] We are not requiring ramped-modal testing instead of conventional discrete-mode testing, since the emission-control systems on Large SI engines generally do not have technologies that are time-sensitive (such as aftertreatment devices that undergo regeneration events), nor are emission levels so low that it is difficult to get accurate measurements over relatively short sampling periods.

Subpart G—Compliance Provisions

Reference	Proposed Change
1048.605	We have made changes to this section to clarify the responsibilities of the original manufacturer of the engine and that of the "engine dressing" company. We also clarify the ABT responsibilities relative to engines or vehicles that are certified under the motor-vehicle program and used in nonroad applications.

[9] Final Regulatory Impact Analysis: Control of Emissions from Nonroad Diesel Engines, U.S. EPA, May 2004, EPA420-R-04-007 (Docket OAR-2004-0017-0044).

1048.610	This section includes the same changes made in 1048.605 and adds a criterion such that adding 500 pounds to the weight of the vehicle is considered to be a substantial change to the engine. This is consistent with the approach we have taken in guidance documents under current regulations. The requirement to avoid changing the emission-control system now includes the refueling controls, since the vehicle is being used in nonroad service in its certified configuration; no engine installation is required.
1048.625	Provisions related to engines burning noncommercial fuels have been modified to clarify the engine manufacturer's responsibilities under this section. We have also modified the definition of noncommercial fuel to include fuel that is, for example, captured from an oil well and sold without processing the fuel to conform to any standardized specifications for commercial fuels.
1048.630	We are adding provisions describing a process by which manufacturers may produce engines that will be used solely for competition. These are consistent with provisions we have adopted for nonroad diesel engines.
1048.635	We are adding provisions that will allow manufacturers to place another company's brand name on the emission control information label. This is consistent with provisions we have adopted for nonroad diesel engines.

Subpart I—Definitions and Other Reference Information

Reference	Proposed Change
1048.801	We are revising the definition of brake power to focus on power required to fuel, lubricate, heat, and cool the engine, rather than on the components that do these things. This is necessary to address the ambiguity that would result from a single component such as a heat exchanger that cools the engine in addition to providing cooling for other purposes.
1048.801	We are revising the definition for constant-speed engines to clarify the that there are two distinct types of constant-speed governing. We also differentiate between constant-speed engines (certified using constant-speed duty cycles) and constant-speed operation (any kind of engine operation that is governed to stay at a constant-speed). This distinction is necessary because some engines that are not restricted to constant-speed certification may be installed in constant-speed applications.
1048.801	We have broadened the definition of noncommercial fuel slightly to allow naturally emitted gases (such as from a landfill) to continue to be noncommercial fuels even if they are sold to an operator, as long as the product is not modified or processed in a way that would allow it to meet applicable standards for commercial fuels.
1048.801	We are changing our rounding specification from ASTM E29 to NIST Special Publication 811. Our understanding is that these two publications have equivalent specifications.
1048.820	We are revising these provisions to clarify that we handle confidential information that we gather from manufacturers during inspections the same way that we handle what manufacturers send to us.
1048.825	We are adding details to better define the process for requesting hearings under part 1048. For example, manufacturers need to send a written request within 30 days of an EPA judgment. Also, we will limit hearings to substantial factual issues. These are consistent with longstanding regulatory provisions from other programs.

Chapter 7: Recreational vehicles (40 CFR part 1051)

I. Summary and Analysis of Comments

The following table describes the comments related to the regulation of recreational vehicles in 40 CFR part 1051, with our response to each of these comments. Most of these comments came from the Motorcycle Industry Council and the International Snowmobile Manufacturers Association.

Issue	Response
1051.230: Allow combined evap families for varying wall thicknesses for tanks and hoses.	We agree with the comment and have changed the regulations accordingly.
1051.135: Clarify that engine label may have a single engine family name for exhaust and evaporative emissions.	We agree with the comment and have changed the regulations accordingly.
1051.515: For permeation testing, the procedures say that fuel-tank outlets must be closed using nonpermeable fittings. The fill cap, gaskets, and petcocks should therefore not be considered part of the fuel tank.	The fill cap and gaskets are clearly part of the designed and manufactured fuel tank, so they are considered part of the fuel tank for testing. Petcocks would not be included, since we consider them auxiliary equipment. We are incorporating these changes in the definition for fuel lines in §1051.801, as described below.
1051.110 and 1051.801: Do not treat vapor lines or lines open to the atmosphere as fuel lines subject to emission standards.	Available data show that closed vapor lines have permeation rates comparable to liquid fuel line, so they should be subject to emission standards. However, vent lines, PCV hoses, and other lines open to the atmosphere are not considered fuel lines subject to permeation standards.
1051.515 and 1051.720: The proposed requirement for linear emission measurements when changing to gasoline as a test fuel for permeation measurements prevents stabilization on gasoline. Making this change would necessitate ABT changes to allow early banking and deficit credits through 2011 model year. ABT calculations for permeation should be based on an assigned rate of 10.4 g/m^2/day.	As described below, the allowance to test with gasoline is for testing convenience and is not intended to allow for the lower measured values that would result from stabilizing with gasoline test fuel. We agree with the comments related to ABT adjustments and have changed the regulations in §1051.720 accordingly, with the notable revision that ABT calculations may be based on an assigned rate of 7.6 g/m^2/day for generating credits and 10.4 g/m^2/day for using credits. The lower figure represents a common emission rate for uncontrolled tanks that have somewhat less susceptibility to permeation, which is appropriate to specify to avoid windfall credits. Credits may alternatively be based on measured values. We also agree that the ABT program should make provision for early banking and deficit credits, as suggested by the manufacturers; these provisions are found in §1051.145(g) and (h), with a corresponding change in §1051.745(b).

1051.515 and 1051.720: Polaris pointed out that EPA's draft regulation language for early credits, as described in the previous item, did not clearly allow the use of credits after the evaporative emission standards started to apply. They also wanted clarification that they could use a baseline level of 10.4/m^2/day for all tanks without new emission measurements.	We agree that §1051.145(g)(4) should state clearly that early emission credits may be used just like credits generated under the full program. We have added language to §1051.720(a)(4) to clarify that manufacturers may select the specified baseline emission rate for all their tanks (except those certified at or below the applicable emission standard).
1051.145(b): Clarify phase-in text to specify that ATV engines above and below 225 cc are considered together for meeting the 50 percent phase-in. Use the same language for the phase-in described for snowmobiles in 1051.103(a)(1).	We agree with the comment and have changed the regulations accordingly.
1051.137: The NER equations need to be adjusted to avoid NER values less than zero.	We agree with the comment and have changed the regulations accordingly.
1051.145(b): The NER equation for products greater 225 cc should apply to products greater than **or equal to** 225 cc.	We agree with the comment and have changed the regulations accordingly.
1051.615: Do not make the changes in the proposed paragraph (e), since the NER equations for those engines are already covered in the labeling section.	We agree with the comment and are not making this proposed change.
1051.501: Clarify the process for approving raw-gas sampling as equivalent. Clarify which provisions in part 91 apply for interim raw-gas measurements.	We believe the improved procedures for raw sampling specified in the proposed changes in part 1065 are adequate to ensure sufficiently accurate results from raw sampling systems. Current raw sampling systems may need upgrades to meet the new requirements, but any raw sampling system that can meet applicable specifications is acceptable for valid measurements. This removes the need for manufacturers to demonstrate that raw-sampling procedures are equivalent to specified procedures with dilute sampling.
1051.145(e)(2): Include alternate ATV standards described in §1051.145(b) in the allowance for raw-gas sampling through 2008 MY.	We agree with the comment and have changed the regulations accordingly, with the additional considerations described for the previous comment.
1051.505 and 1051.615: Specifying a ramped-modal duty cycle is acceptable, as long as it is at manufacturer's discretion.	We agree with the comment and have drafted the regulations accordingly. EPA testing, however, may use ramped-modal testing even if manufacturers opt for discrete-mode testing.
1051.135: Engine label: don't require engine manufacturing date in the owners manual as an alternative to the label. Allow date stamp on vehicle, not just engine.	We agree with the comment and have changed the regulations accordingly.
1051.135: The regulations should clarify that the duplicate label is needed only if the original label is not visible "during normal maintenance."	We agree with the comment and have changed the regulations accordingly.
1051.310(g): For PLT testing, omit requirement to test at least five engines, and add a rounding requirement to the 1 percent limit on testing	Given the separate PLT sampling rate for small-volume families, we agree that it is appropriate to rely on the one-percent criterion alone to establish an upper limit on testing. Rounding the calculated value to the nearest whole number is appropriate.

1051.225(f) and 1051.701(e): The proposed change to limit mid-year FEL changes to future production is inappropriate, since manufacturers have been planning for compliance based on an ability to make FEL changes retroactive to cover a full engine family.	We agree that the most appropriate remedy for recreational vehicles failing PLT tests is to require a recalculation of ABT credits for the whole family. We are therefore not pursuing the proposed change.
1051.1(a): Treat high-speed utility vehicles as ATVs, even if max power is over 30 kW, as long as the engine is already certified under part 1051.	This suggested change is outside the scope of the proposal. We expect to consider any such change in the context of a future rulemaking. Note that we are adjusting the test procedures for Large SI engines in part 1048 to address these concerns (see Chapter 6).
1051.301: Allow omitting PLT for non-ABT families also for Phase 3. Don't repeat list of standards in 301(h).	We believe it is not appropriate to pre-judge a final decision regarding Phase 3 emission standards. Once we understand better which technologies manufacturers will use for Phase 3 engines, we can make an informed judgment regarding the appropriateness of extending the provision to waive production-line testing for engine families not participating in ABT. We have removed the duplicate provisions in §1051.145.
1051.240(d): Specify that there is a single deterioration factor for HC+NOx, instead of applying separate deterioration factors and adding results.	In the case of spark-ignition engines, it is especially true that changing carburetor calibrations and other things affecting air-fuel ratios have a direct inverse relationship on HC and NOx emissions. Where deterioration factors are based on service accumulation through the entire useful life, we believe it is therefore appropriate to base deterioration factors for spark-ignition engines subject to HC+NOx emission standards on a single deterioration factor for the combined pollutants. We are making a related, additional change to clarify that manufacturers must include both low-hour and deteriorated emission measurements for each pollutant, rather than reporting only HC+NOx emissions as a sum.
1051.210: The provisions for preliminary approvals should be revised to add assurance that EPA won't reverse a decision without establishing that the manufacturer intentionally used false information in its request or that the preliminary approval would lead to noncompliance.	We agree with the concern expressed and have changed the regulations to limit reversed decisions to circumstances where new information becomes available.
1051.255: Regarding EPA decisions: -The requirement to provide reasonable assistance should be limited to those things specifically required by warrant, court order, or the regulations. -The meaning of the new paragraph 1051.255(c)(7) is unclear and should be removed. This paragraph would allow EPA to make a judgment for actions that circumvent the intent of the Act or the regulation. -Revise the requirement for submitting information, requiring only submissions needed to comply with regulatory provisions.	-All manner of reasonable assistance is required to support EPA's efforts to access information that should be made available; we believe the reasonable assistance should not be limited as described in the comment. -We believe it is quite clear to prohibit circumventing the Act or the regulation. -We agree that the information submissions should be limited to regulatory provisions, and are changing §1051.255(d) accordingly.
1051.115(a): Require closed crankcases only through useful life.	We agree with the comment and have changed the regulations accordingly.

1051.115(d): Clarify adjustable parameters to allow specified carburetor screw settings on a jet chart.	We agree with the comment and have changed the regulations accordingly.
1051.301: Allow PLT "families" based on an aggregation of engine families using common technologies. Failing engine families would trigger more testing for related engine families.	While we do not believe it is appropriate to make this suggested change, under the current regulations manufacturers may pursue alternate programs to comply with production-line testing requirements. Programs yielding an equivalent assurance of emission control can be considered in the context of our certification process.
1051.701: Allow evap credits to be exchanged across all categories of recreational vehicles to avoid product disruptions during transition to new standards.	We believe it is still appropriate to prevent credit exchanges across vehicle categories. Since this is a first effort to set evaporative standards for this category, we are concerned that manufacturers would be able to generate sufficient credits to allow them to avoid product improvement for a substantial portion of their production. Also, the level on the standards were selected based on the corresponding credit program. Expanding the flexibility of the credit program would therefore call for reducing the level of the standard.
1051.701(d): Drop the proposed provision to limit manufacturers' ability to include in ABT calculations those engines sold in states with separate emission standards.	We are adopting a provision in the final rule to require exclusion of California sales from federal ABT calculations if a company is subject to more stringent state standards, or if a company generates or uses emissions credits to show that it meets California standards. This provision is necessary to prevent double-counting of emission credits. In the case of recreational vehicles, California adopted emission standards that predate the EPA rulemaking. The California emission standards are based on a similar technology assessment, but are in a very different form. For example, California specifies different numerical standards that apply to hydrocarbon emissions only, while EPA's standards apply to HC+NOx emissions. Given the difficulty in comparing these two sets of standards, we are making the judgment that, for the purposes of ABT calculations, California's current exhaust emission standards are equivalent to the EPA standards. Under the current requirements, companies would therefore exclude their California products from federal ABT calculations only if those products generate or use emission credits under the California program. If California adopts new standards for recreational vehicles, we will again make a judgment regarding the relative stringency of the two programs for ABT purposes.
1051.125: Apply the proposed changes in non emission-related maintenance from Large SI engines (part 1048) to recreational vehicles (part 1051).	We agree with the comment and have changed the regulations accordingly.
1051.515: Add a tolerance of ±2°C to the specified temperature for measuring permeation emissions.	We agree that the specified temperature needs a tolerance to have a complete meaning, and believe that the suggested ±2°C is appropriate for this particular measurement.

1051.103, 1051.105, and 1051.107: Don't exclude California sales from the phase-in demonstration.	We agree that it is not necessary to specify that manufacturers should segregate out their California sales for one year to show that they meet the targeted sales levels to meet phase-in requirements.
1051.110: Change the compliance requirement from "All your new vehicles must meet the emission standards..." to "Your new vehicles must be certified to comply with the emission standards." This would remove the possibility of third parties taking legal action for individual failing engines.	We believe it is important to maintain the principle that manufacturers are responsible for the emission-control performance of each vehicle. While our recall provisions implement a process for taking action, we do not want to imply that a manufacturer's responsibility for products that have been certified is limited to such a finding.
1051.120: Don't apply emission-related warranty requirements to components that are covered by a service contract purchased by the consumer.	As described in the preamble, we agree with this comment and have changed the regulations for all engine categories where this change is necessary.
1051.125: Allow inspections of test vehicles during service accumulation to ensure safe operation.	We agree with the comment and have changed the regulations accordingly.
1051.135: Omit the requirement to include an engine's power rating on the emission control information label, since this conflicts with the longstanding federal policy discouraging the use of rated power for marketing purposes.	We agree with the comment and have changed the regulations accordingly. The label continues to require engine displacement, which is consistent with the common approach of identifying an engine's capability.
1051.801: Clarify the proposed change to the definition of "useful life," in which manufacturers are directed to disregard the element of useful life related to engine operating hours if engines have no odometer or hour meter.	We agree that the proposed language was unclear. The definition now states that a vehicle's useful life determination is not affected by the degree of engine operation unless the number of hours or kilometers can be verified, either with a meter or through some other means.
1051.515: Adding timing flexibility to the procedure for exposing fuel tanks to ultraviolet light. The original regulations called for exposing tanks to ultraviolet light for 15 hours per day for 30 days. Testing for 450 consecutive hours instead of simulating intermittent sun exposure would allow for accelerated testing.	We believe this flexibility would allow for reduced testing burden without sacrificing the intent of the durability procedure and have changed the regulations to specify a 450-hour exposure to the specified ultraviolet light.

In addition to these comments, we have identified a variety of additional changes and adjustments to include in the final rule. There are a variety of changes simply to correct typographical, grammatical, and nomenclature errors, or to make minor clarifications. In addition, these changes include:

- 1051.205: Specifying that manufacturers must name an agent for service of process in the United States. This puts into the regulations a well established expectation to identify a person in the United States who can represent the company for official business.
- 1051.230: Differentiating emission families based on production methods for fuel tanks or fuel lines. This would, for example, keep sulfonated and fluourinated fuel tanks of the same size and wall thickness in separate families.
- 1051.243(b)(1): Requiring that intermediate test points be evenly spaced over the service-accumulation period.

- 1051.243(b)(4): Specifying a simple, straight-line calculation for deterioration factors where there are only low-hour and full-life emission values. This is necessary, since it is not mathematically possible to do a least-squares fit with only two data points. The linear least-squares fit applies to any calculations involving three or more data points.
- 1051.801: Revising the specified point of low-hour testing from 100 hours or 1,000 kilometers to 24 hours or 240 kilometers. This reflects current practice and prevents a manufacturer from selecting a low-hour test point that is significantly through the applicable useful life.
- 1051.301(h): Clarifying that manufacturers may omit production-line testing for their engine families only if they do not rely on ABT calculations to show compliance with any of their families.
- 1051.501(b): For products using motorcycles and ATVs using chassis-based procedures in 40 CFR part 86, adding the provision to consider emissions stabilized after 12 hours of engine operation. This is consistent with the specification already adopted in 40 CFR part 1065 for engine-based testing.
- 1051.501(d): Specify that service accumulation may be done using a commercially available fuel in addition to the specified test fuel.
- 1051.505: Omitting the maximum run time and sampling time in each mode only for engines that use NOx aftertreatment. Specifying maximum values is important for appropriately measuring emissions from lean-burn engines, but this is not necessary for the more common experience of stoichimetric or rich air-fuel ratios.
- 1048.605 and 1048.610: Clarifying the provisions that apply to recreational vehicles relying on certification from highway or Large SI programs.
- 1051.805: Adding a definition of owners manual to include a collection of documents for the operator. This change is responsive to a comment from a manufacturer of engines not covered by part 1051.
- 1051.515: Adding a definition for ultraviolet light to identify the applicable wavelength of 300 to 400 nanometers. This change is needed for selecting light bulbs for aging fuel tanks to simulate daylight exposure. This is consistent with the commonly accepted wavelength range representing the ultraviolet light that penetrates the atmosphere and cloud cover.

II. Summary of Rulemaking Changes

We are making several adjustments to the test procedures, definitions, and other provisions related to the emission-control program for recreational vehicles.

1. Evaporative Emission Family Definition (§1051.230)

Manufacturers certify their fuel systems by grouping them into emission families that have similar emission characteristics. The emission family definition is fundamental to the certification process and to a large degree determines the amount of testing required for certification. In the preamble for recreational vehicle final rule (67 FR 68242, November 8, 2002), we stated that "the regulations include specific characteristics for grouping emission families for each category of tanks and hoses. For fuel tanks, key parameters include wall thickness, material used (including additives such as

pigments, plasticizers, and UV inhibitors), and the emission-control strategy applied. For hoses, key parameters include material, wall thickness, and emission-control strategy applied."

However, the regulatory text simply states "evaporative emission controls" as a subset of the engine family without detailing specific characteristics. We are modifying §1051.230(b)(8) to include the key parameters discussed above. Types of evaporative emission controls include, but are not limited to, permeation barriers, surface treatments, and barrier platelets (i.e., Selar®). In response to comments, we are also adjusting the proposed language to clarify that tanks and hoses with varying wall thickness may be included in the same engine family, as long as the products selected for testing result from the same manufacturing processes, and are the most thin-walled in the family to ensure worst-case measurements.

In addition we are restructuring this section to distinguish between exhaust and evaporative emission families. Currently, the regulations state that "you may ask us to create separate families for exhaust emissions and evaporative emissions." The regulations now specify that the primary approach is for separate exhaust and evaporative emission families, with the option for the manufacturer to combine these families into a single emission family.

2. Sealing the Fuel Tank During Permeation Testing (§1051.515)

Section 1051.515 of the regulations specifies that the fuel tank must be sealed during the preconditioning fuel soak and permeation test. In §1051.515(a)(5), we expanded on how a tank may be sealed by stating: "Seal the fuel tank using nonpermeable fittings, such as metal or Teflon™." This statement, as it is written, has led to some confusion. One manufacturer was under the impression that they could seal all openings in the fuel tank with metal fittings including those openings that would be sealed in some other way in production vehicles.

However, the intent of this statement was only to allow nonpermeable plugs in openings that are not normally sealed, such as hose connection fittings. In the case where a fuel cap directly mounted to the fuel tank, the production fuel cap (including gaskets) must be used during a permeation test. The inside surface area of the fuel cap must be included in the calculation of total tank surface area. However, if there is a vent hole in the fuel cap, the vent hole may be sealed using a nonpermeable plug.

We are modifying §1051.515(a)(5) to read:

Seal the fuel tank using fuel caps and other fittings (excluding petcocks) that can be used to seal openings in a production fuel tank. In cases where openings are not normally sealed on the fuel tank (such as hose-connection fittings and vents in fuel caps), these openings may be sealed using nonpermeable fittings such as metal or fluoropolymer plugs.

In addition, we are clarifying the definition of fuel system to state: "In the case where the fuel tank cap or other components (excluding fuel lines) are directly mounted on the fuel tank, they are considered to be a part of the fuel tank."

3. Definition of fuel lines (§1051.801)

The original permeation provisions for fuel hose referred to "fuel lines" without providing a definition of what fuel lines are. The intent of the permeation standards is to prevent hydrocarbons from permeating through the walls of the fuel system. This permeation occurs at the same rate for materials exposed to saturated fuel vapor as it does for materials exposed to fuel.[10,11,12,13] The intent of the permeation standards was therefore to include all hose and tubing in the fuel system that carries fuel or fuel vapor. However, as discussed in the comments, this does not include fuel lines that are open to the atmosphere. To clarify these points we are adopting the following definition:

> Fuel line means all hoses or tubing designed to contain liquid fuel or fuel vapor. This includes all hoses or tubing for the filler neck, for connections between dual fuel tanks, and for connecting a carbon canister to the fuel tank. This does not include hoses or tubing for routing crankcase vapors to the engine's intake or any other hoses or tubing that are open to the atmosphere.

4. Timing of the permeation test run (§1051.515)

The permeation test for fuel tanks currently includes a soak period on gasoline blended with 10% ethanol (E10). The purpose of this soak is to stabilize the permeation rate of the fuel through the fuel tank. E10 is used because it generally represents the worst case for fuel that is commonly used by in-use vehicles. After the soak, the fuel tank is drained and refilled with fresh fuel prior to the permeation weight loss test. The intent is to begin the test as soon as the fuel in the tank reaches the test temperature. However, the original regulations to not specify the allowable period between the fuel soak and the permeation test run. We now require the permeation test run to begin within eight hours of fueling the tank. This should provide ample time for the fuel to stabilize within the test temperature range.

The length of the test run as described in the preamble is two weeks. This was determined to be ample time for the weight loss to be large enough for an accurate measurement to be made on a fuel tank meeting the permeation standards. In the regulations, we specify a range of 2 to 4 weeks using good engineering judgement based on the permeation rate. The intent of this is to allow more time for tests on very low permeating fuel tanks to gain a large enough weight loss to make an accurate

---

[10]Tuckner, P., Baker, J., "Fuel Permeation Testing using Gravimetric Methods," SAE Paper 2000-01-1096, 2000, Docket A-2000-01, Document IV-A-96.

[11]Nulman, M., Olejnik, A., Samus, M., Fead, E., Rossi, G., "Fuel Permeation Performance of Polymeric Materials," SAE Paper 2001-01-1999, 2001, Docket A-2000-01, Document IV-A-23.

[12]Stevens, M., Demorest, R., "Fuel Permeation Analysis Method Correction," SAE Paper 1999-01-0376, 1999, Docket A-2000-02, Document IV-A-03.

[13]Lockhart, M., Nulman, M., Rossi, G., "Estimating Real Time Diurnal Permeation from Constant Temperature Measurements," SAE Paper 2001-01-0730, Docket A-2000-01, Document IV-A-21.

measurement. We clarify the appropriate test length by more clearly defining when a four-week test may be used.

The concern with the above timing issues relates primarily to the effects of ethanol on a fuel system. When the fuel tank is soaked using E10, the ethanol in the fuel can temporarily change the structure of the polymers used to construct the fuel tank. This change in structure increases the permeation rate through most materials. The fuel permeation test run itself can be performed using either gasoline or E10. We anticipated that either fuel would produce the same permeation results because, even if gasoline were used, the effects of the ethanol fuel soak would not be reversed in the short time needed to perform the weight loss test. Clearly, if the fuel tank were allowed to soak too long with gasoline during the permeation test, the effects of the ethanol soak would be reversed and the measured emissions could be underestimated.

To provide further assurance that the effects of the ethanol soak are included in the permeation test, we are adopting another requirement for fuel tanks tested for permeation on gasoline. Weight measurements of the fuel tank must be made daily. In this case, "daily" means five days per week to allow for weekends. The daily weight loss must be plotted versus time to determine if a linear relationship is observed. We expect that if the ethanol effects were to begin to reverse, that the slope of the weight loss line would flatten. If a linear relationship (minimum R-squared of 0.8) was not seen through the entire permeation test run, the test would be void. To avoid the issue of fuel effects on the permeation rate, EPA will likely perform any confirmatory tests using E10 fuel.

5. Phase-In for Youth ATV and Off-Highway Motorcycle Models (§1051.105)

It was our intention in the recreational vehicle regulations to include youth ATV and off-highway motorcycle models to be counted in the phase-in percentage requirements for ATVs and off-highway motorcycles. We are adopting language to clarify that ATVs with a total displacement of 100 cc or less and off-highway motorcycles with a total displacement of 70 cc or less will count in the phase-in (percentage) requirements of §1051.105.

6. CO Maximum FEL for ATVs (§1051.107)

For standards that allow averaging, EPA has traditionally set a maximum allowable family emission limit (FEL) to ensure that manufacturers won't establish FELs that unneccesarily exceed the standard. Table 1 of §1051.107, which lists the exhaust emission standards for ATVs, lists a maximum allowable family emission limit of 50 g/km for the CO standard. However, since there is not an option for CO averaging for ATVs, there is no need for a maximum allowable family emission limit. We are therefore removing the FEL cap of 50 g/km for ATVs.

7. Emission-Related Warranty Period (§1051.120)

The language in §1051.120(b) states "the emission-related warranty period must be valid for at least 50 percent of the vehicles minimum useful life in kilometers." However, many recreational

vehicles are equipped with hour-meters instead of odometers. Therefore it makes sense to add "hours of engine operation" to §1051.120(b).

8. NER Equations (§1051.145 and §1051.137)

The regulations require manufacturers to label all their certified vehicles with a removable hang-tag showing its emission characteristics relative to other models. In lieu of providing certification emission levels on the tag, manufacturers are required to calculate and provide a normalized emission rate (NER). The regulations require manufacturers to round the NER to the nearest whole number. However, we believe that it is more appropriate and equitable to round to one decimal place instead. We are therefore modifying the regulations to allow rounding to one decimal place rather than to the nearest whole number.

We are also adopting an additional equation for engines under 225 cc that are certified to g/kW-hr standards. The new equation is similar to the existing equation that will continue to apply to larger engines certified under §1051.145(b), but accounts for the higher standards that apply to engines under 225 cc.

9. Useful Life for Youth ATV and Off-Highway Motorcycle Models (§1051.107 and §1051.107)

In §1051.105(c) and §1051.107(c), we state that "...ATVs and off-highway motorcycles must meet a minimum useful life of 10,000 kilometers, 1000 hours of operation, or five years, whichever comes first." The Motorcycle Industry Council (MIC) provided us with survey data that indicates that for off-highway motorcycles with a displacement less than 70 cc and ATVs with a displacement less than 100 cc, the minimum useful life should be half of that for the larger displacement models. We are therefore changing the minimum useful life for these youth models to 5,000 kilometers and 500 hours.

10. Raw Gas Sampling Provisions (§1051.145 and §1051.501)

In the preamble of the final rule adopting standards for recreational vehicles, we described our intent to allow all ATVs certifying to the J1088 cycle to use existing raw-gas sampling procedures. However, through oversight, this provision did not appear in the regulations. We are therefore adopting the intended provision allowing all ATVs certifying to J1088 to use the raw gas sampling provisions of 40 CFR part 90 or 91 for engine testing through the 2008 model year. ATVs under 100 cc and off-highway motorcycles under 70 cc certifying using J1088 may continue to use these raw-gas sampling procedures through the 2010 model year.

11. Engine Test Speed (§1051.501)

The International Snowmobile Manufacturers Association (ISMA) and the Motorcycle Industry Council (MIC) have both stated that due to the nature of how snowmobiles and ATVs operate, §1065.515(d) which describes how to determine "maximum test speed," is inappropriate and overly

burdensome. They have suggested language that significantly reduces the number of steps involved in determining maximum test speed. ISMA has suggested the following language: "Maximum test speed for snowmobile testing is the maximum steady speed of the installed engine during normal in-use operation at wide-open throttle." MIC suggested the following language: "For constant-speed engines, maximum test speed is the same as the engine's maximum operating speed in use. For variable-speed engines, maximum test speed is the vehicle's rated speed, where rated speed is the point at which the engine's peak power occurs." Rather than the specific wording recommended, we are adopting a more general approach that allows manufacturers to test engines from recreational vehicles based on an engine's maximum power if that better represents in-use operation (see §1051.501(e)).

12. Low-speed ATVs (§1051.801)

There are two types of vehicles that meet the definition of all-terrain vehicle. First, traditional ATV models have four wheels, a single seat straddled by the rider and handlebars. We also define other vehicles to be all-terrain vehicles if they are designed for operation over rough terrain. However, we exclude rough-terrain vehicles if they meet certain criteria as utility vehicles. Manufacturers have raised the concern that they produce low-speed models that meet the second meaning of the definition for all-terrain vehicle. The engine technology and vehicle operation, however, are much more like that for Small SI engines covered under 40 CFR part 90. To address this, we are setting a threshold to qualify as an all-terrain vehicle under this second meaning of the definition. Any such vehicles with maximum speed below 25 miles per hour will not be considered all-terrain vehicles and will therefore be subject to emission standards under 40 CFR part 90.

13. Ramped-modal Testing (§1051.505 and §1051.615)

As described in Chapter 1, we have developed a testing method that simplifies steady-state emission measurements. Ramped-modal procedures combine the several discrete modes into a defined sequence of operation with a fixed amount of time in each mode to capture the appropriate weighting factor for individual modes. Emissions are measured continuously during engine operation, so there is a single measurement to quantify, rather than separately measuring emissions from each mode and mathematically determining the overall brake-specific emission level. We are adopting a provision allowing manufacturers to use either the established discrete-mode duty cycle or the equivalent ramped-modal duty cycle for engine testing.

14. Other Changes

We adopted emission standards for recreational vehicles in November 2002 (67 FR 68242). The regulations in 40 CFR part 1051 were our first attempt to draft emission-control regulations in plain-language format. In the recent final rule for nonroad diesel engines, we went through a similar process, including extensive interaction with a different set of manufacturers. This process led us to adopt regulatory provisions in 40 CFR part 1039 that differ from those in part 1051. Since the process of meeting standards, applying for certificates, and complying with other emission-related requirements has a lot of commonality across programs, we have a strong interest in adopting

consistent provisions and uniform terminology as much as possible. As a result, we are extensively changing part 1051 to align with the regulations in part 1039.

Many of the changes for part 1051 involve relatively minor wording differences. Several other changes involve new or revised language to express a regulatory provision more clearly without changing the underlying policy. There are also some minor organizational changes to move certain provisions to a different location that better reflects their relationship to the overall process of certifying engines. We believe it is important to make these changes to avoid a situation where we unintentionally apply slightly different provisions to different categories of engines. These changes that are intended to involve no change in policy are not listed here.[14]

The following tables highlight many of the specific changes to part 1051.

I. Subpart A—Overview and Applicability

Reference	Proposed Change
1051.1	We now state that the part 1051 requirements apply to recreational vehicles, rather than to the manufacturers of recreational vehicles.

II. Subpart B—Emission Standards and Related Requirements

Reference	Proposed Change
1051.120(a)	The scope of the warranty now explicitly includes secondary purchasers to make clear that the emission-related warranty is fully transferrable throughout the specified warranty period. Also, the scope of the warranty includes the engine and all its emission-related components.
1051.120(b)	Warranty periods are clarified: (1) If mechanical warranties are offered without charge, the emission-related warranty for the corresponding components (or the whole engine, as applicable) may not be shorter than the mechanical warranty. (2) We clarify that the warranty period starts when the engine is first placed into service.
1051.120(c)	We clarify that the warranty includes components such as catalysts that are manufactured by another company, even if the component is shipped separately and the certifying manufacturer never takes possession of those components.
1051.120(e)	We add a requirement for manufacturers to describe the emission-related warranty provisions that apply to their engines in the owners manual.
1051.125(c)	The rule originally allowed for extra maintenance for special situations. We are clarifying this to point out that manufacturers must make clear to the operator that this additional maintenance is tied to some special situation.
1051.125(g)	This provision was originally adopted as §1051.120(d). We have modified this to more carefully track provisions in the Clean Air Act. In particular, this provision now clarifies that owners must generally pay for scheduled maintenance, with an exception for relatively expensive parts that have been added to meet emission standards and that are not needed for proper engine performance.

[14] See "Redline Version of 40 CFR Part 1051 Showing Proposed Changes," EPA memo from Alan Stout to Docket OAR-2004-0017, July 5, 2004.

1051.125(h)	Consistent with §1051.125(g), we now require manufacturers to communicate the owner's obligations to properly maintain their engines.
1051.130(d)	We have added a provision allowing manufacturers to communicate installation instructions to engine installers other than sending a copy of the instructions along with each engine. Manufacturers may describe in their application for certification that they, for example, post their installation instructions on a publicly available web site.
1051.135(c)	We have modified the requirements for the emission control information label: (1) We now allow manufacturers to apply the corporate name and trademark from another company, (2) The manufacturing date need not be on the label, as long it is as the manufacturer keeps records that allow us to find out the manufacturing date or stamp the date on the engine or vehicle, (3) Only the exhaust emission levels must be printed on the label.
1051.135(d)	We are adding a provision to specifically allow manufacturers to include additional label information related to meeting other emission standards, or properly maintaining engines.
1051.135(g)	We are adding a requirement for engine manufacturers to supply duplicate labels to equipment manufacturers that need them and to keep basic records to document the transactions. We have already adopted corresponding limits on what equipment manufacturers must do to properly apply these duplicate labels and prevent abuse, such as proliferation of counterfeit labels.
1051.145(c)	We are correcting the provision related to waived production-line testing for engines that do not generate or use ABT credits; the corrected language refers to all the different emission standards to which this applies. We are also moving this provision to §1051.301, since it does not expire.

III. Subpart C—Certifying Engine Families

Reference	Proposed Change
1051.201(g)	We are including a clearer statement that we may require manufacturers to deliver test engines to a particular facility for our testing.
1051.205(a)	We are clarifying the direction to describe emission-control systems to require that manufacturers identify each unique configuration.
1051.205(b)	We are adding a clarifying note to include part numbers for emission-related components. This information, which is already commonly included in applications, helps us to manage the information related to the certified configuration, especially as it relates to running changes in an engine family.
1051.205(b)(11)	The instructions for completing the certification application now include detailed items related to auxiliary emission-control devices. This clarifies the manufacturers' existing responsibility to describe their emission-control systems.
1051.205(k)	Add a requirement to include the hang-tag label with normalized emission rates in the application for certification.
1051.205(t)	In addition to the existing requirement to describe adjustable parameters, we are including a requirement to describe how the adjustment limits are effective in preventing operators from making inappropriate adjustments.
1051.250(b)	We are adding a requirement to keep records related to production figures by separate assembly plants and lists of engine identification numbers in each engine family.

IV. Subpart D—Testing Production-Line Engines

Reference	Proposed Change
1051.310(g)	Clarify that the maximum testing rate of 1 percent for production-line testing is determined by rounding the calculated value to the nearest whole number. We are not adopting the proposed requirement to test a minimum of five vehicles, as described above.
1051.345	Change reporting requirements based on calendar quarters to refer instead to the test period. This addresses small-volume families for which the test period is the full model year.

V. Subpart F—Test Procedures

Reference	Proposed Change
1051.501(a)	We no longer specify that testing must include measurement of CO_2 emissions. However, if manufacturers use equipment and procedures that require measurement of CO_2 emissions, then this information must be included in the application for certification (see §1051.205).
1051.520	The provisions that were adopted under this section are now included under §1051.243.

VI. Subpart G—Compliance Provisions

Reference	Proposed Change
1051.605	We have made changes to this section to clarify the responsibilities of the original manufacturer of the engine and that of the "engine dressing" company. We also clarify the ABT responsibilities relative to engines or vehicles that are certified under the motor-vehicle program and used in recreational vehicles.
1051.610	This section includes the same changes made in 1051.605 and adds a criterion such that adding 500 pounds to the weight of the vehicle is considered to be a substantial change to the engine. This is consistent with the approach we have taken in guidance documents under current regulations. The requirement to avoid changing the emission-control system now includes the refueling controls, since the vehicle is being used in nonroad service in its certified configuration; no engine installation is required.
1051.635	We are adding provisions that will allow manufacturers to place another company's brand name on the emission control information label. This is consistent with provisions we have adopted for nonroad diesel engines.

VI. Subpart H—ABT Provisions

Reference	Proposed Change
1051.701	We clarify the limits on using emission credits across families and model years, especially as it relates to noncompliant engines.
1051.705	We clarify the process for reconciling the balance of emission credits at the end of the model year.
1051.710	We clarify the process for banking emission credits and using banked emission credits.
1051.715	We clarify the process for trading emission credits.

1051.725 - 735	We clarify the requirements for sending us ABT-related information in the application for certification and the end-of-year report, and for keeping such records.
1051.745	We clarify the legal liabilities associated with using ABT provisions to comply with emission standards.

VII. Subpart I—Definitions and Other Reference Information

Reference	Proposed Change
1051.801	We are revising the definition of brake power to focus on power required to fuel, lubricate, heat, and cool the engine, rather than on the components that do these things. This is necessary to address the ambiguity that would result from a single component such as a heat exchanger that cools the engine in addition to providing cooling for other purposes.
1051.801	We are changing our rounding specification from ASTM E29 to NIST Special Publication 811. Our understanding is that these two publications have equivalent specifications.
1051.820	We are revising these provisions to clarify that we handle confidential information that we gather from manufacturers during inspections the same way that we handle what manufacturers send us.
1051.825	We are adding details to better define the process for requesting hearings under part 1051. For example, manufacturers must send a written request within 30 days of an EPA judgment. Also, we will limit hearings to substantial factual issues. These are consistent with longstanding regulatory provisions from other programs.

Chapter 8: Test Procedures (40 CFR part 1065)

I. Summary and Analysis of Comments

We received comments on many of the proposed provisions in part 1065, with additional comments raising new issues for us to consider. The majority of these comments have been addressed by making changes to the regulations. These changes are described in section 8.II. The following discussion presents a summary and analysis of a few these comments that warrant extended discussion and other comments which are not being incorporated.

A. Representative testing

Manufacturers expressed concern about the requirement in §1065.10(c)(1) for manufacturers to notify us in cases in which they determine that the specified test procedures would result in measurements that do not represent in-use operation. Specifically, they expressed concern about the potential impact on stringency, the need for lead time to make changes, the vagueness of the language, and the need for changes to be made through a notice and comment rulemaking. In response to their concerns, we have modified this provision as follows to make it clearer what the manufacturers burdens are and what process EPA would use to modify the test procedures:

> §1065.10(c)(1) The objective of the procedures in this part is to produce emission measurements equivalent to those that would result from measuring emissions during in-use operation using the same engine configuration as installed in a vehicle. However, in unusual circumstances these procedures may result in measurements that do not represent in-use operation. You must notify us if good engineering judgment indicates that the specified procedures cause unrepresentative emission measurements for your engines. Note that you need not notify us of unrepresentative aspects of the test procedure if measured emissions are equivalent to in-use emissions. If you notify us of unrepresentative procedures under this paragraph (c)(1), we will cooperate with you to establish whether and how the procedures should be appropriately changed to result in more representative measurements. While the provisions of this paragraph (c)(1) allow us to be responsive to issues as they arise, we would generally work toward making these testing changes generally applicable through rulemaking. We will allow reasonable lead time for compliance with any resulting change in procedures. We will consider the following factors in determining the importance of pursuing changes to the procedures:
>
> (i) Whether supplemental emission standards or other requirements in the standard-setting part address the type of operation of concern or otherwise prevent inappropriate design strategies.
>
> (ii) Whether the unrepresentative aspect of the procedures affect your ability to show compliance with the applicable emission standards.
>
> (iii) The extent to which the established procedures require the use of emission-control technologies or strategies that are expected to ensure a comparable degree of emission control under the in-use operation that differs from the specified procedures.

We believe this revised language addresses the manufacturers' concerns. At the same time, this language retains the principle features of the old language. First, it clearly states that the goal of the test procedures is to "produce emission measurements equivalent to those that would result from measuring emissions during in-use operation using the same engine configuration as installed in a vehicle." Clearly, the purpose of our regulations is to achieve in-use emission reductions by requiring manufacturers to demonstrate that they meet certain emission standards. For example, the recall requirements in §207(c)(1) of the Clean Air Act refer to conforming to the regulations when the engine is "in actual use". Thus, it is important that certification emission testing be largely representative of in-use operation. Testing that is not representative of actual in-use operation does not necessarily tell us anything about whether any emission reductions occur. By including this clear statement of our intent, we hope to discourage manufacturers from considering only the specified test procedures, rather than in-use performance, when designing their emission controls. Most manufacturers would, as a matter of good faith, consider both the test procedures and in-use performance. This provision will provide these manufacturers with the assurance that we will ensure that all other manufacturers are being equally responsible.

Second, the revised language recognizes that in most cases, it will be the manufacturers themselves who will first become aware of potential problems with the representativeness of the test procedures for their engines. When they do become aware of such problems, it would not be appropriate for the manufacturers to withhold such information from us, and we are unlikely to ask for such information unless we are already aware of the problem. Thus, this provision requires that manufacturers notify us of such problems. This provision does not create an obligation for manufacturers to find all potential problems, but only to notify us when they become aware of them. Without this notification, we would likely be unable to achieve the stated goal of the test procedures. However, in response to manufacturers concerns we have added a sentence noting that they do not need to notify us in cases in which the measured emissions would still be equivalent to in-use emissions. It is important to emphasize that we are stating that emissions need to be "equivalent" rather than "the same as" in-use emissions. We say "equivalent" because we are only interested in test details that have a significant impact on measured emission levels. We recognize that many compromises must be made between the practicality of testing and the matching of in-use operation. We have considered many aspects of the test procedures in this respect for the engines and emission controls of which we are currently aware. We have concluded that the test procedures in part 1065 will generally result in emission measurements that are sufficiently representative of in-use emissions, even though not all in-use operation will occur during testing. Thus, we expect manufacturers to need to notify us only when they discover some unrepresentative feature of the test procedures specific to a given engine design or resulting from the application of some new emission control technology.

Finally, the revised language still includes the flexibility to modify the test procedures to make them more representative of in-use operation. However, we have added new language to recognize that while some minor changes can be made immediately, others will require some additional lead time, and still others we likely require a full notice and comment rulemaking. The new regulatory language also states that we will work cooperatively with the manufacturers to make the changes. It is not our intent to use this as a means of increasing the stringency of the standards.

B. NOx Definition

In subpart C of part 1065, we specify the use of either a chemiluminescent detector (CLD) or a nondispersive ultraviolet (NDUV) analyzer to measure NOx concentrations. We also note in the regulations that these analyzers measure only NO and NO2, and that manufacturers need to use good engineering judgment to measure other oxides of nitrogen. Manufacturers were concerned that this could lead to confusion about whether or not they are required to measure any other oxides of nitrogen. Thus we have revised the regulations to clarify that manufacturers only need to measure other oxides of nitrogen when directed by the standard-setting part. Manufacturers had asked to remove the entire reference to other oxides of nitrogen. However, it is necessary to retain this reference to avoid confusion about what is being measured. This approach is appropriate at this time since conventional engines and aftertreatment systems do not emit significant amounts of NOx species other than NO and NO2. Moreover, the allowance for the use of other measurement procedures addresses the possibility that other oxides of nitrogen may need to be measured under future standards-setting parts or to address future public health risks such as those prohibited by §1048.115(f).

C. Other comments

MIC commented that the provisions for alternate test procedures appear to disallow using more accurate or more precise procedures in §1065.10. This was not intended. We have revised the text to clarify that improved accuracy and precision don't preclude equivalence.

D. Part 1065 Comments Not Being Incorporated into Regulatory Text

Comment	Response
1065.1(a)(2) indicates that 1065 applies to land-based nonroad diesel engines regulated under 40CFR 1039. 1039.1 indicates that part 1039 phases in 2008- 2012 by power category. Is it intended that 1065 procedures can not be used for some NR engines until 2012 MY?	In §89.114 we state that "a manufacturer may elect to use the test procedures in 40 CFR part 1065 as an alternate test procedure without advance approval".
1065.1(g) provides at website for "additional information and updates regarding these procedures." A website posting must not become a mechanism for "back door" rulemaking.	We will not use website postings in an attempt to circumvent our Administrative Procedure Act obligation for notice and comment rulemakings.
1065.2(e) Is 40 CFR 2.301 a correct cite?	It is correct.

1065.10 (c) (6) states that "During the 12 months following the effective date of any change in the provision of this part 1065, you may ask to use data collected using procedures specified in the previously applicable version of this part 1065." Use of the previously applicable version should not subject to approval. Testing data from carryover families must be allowed regardless of changes to the 1065 test procedures.	We cannot categorically allow use of earlier procedures. Some of the future changes we will make to part 1065 may be so necessary technically that it may be inappropriate to allow the use of earlier procedures. The use of carryover is a separate issue that should be addressed for each engine category in the standard-setting part. This provision does not restrict any use of carryover data allowed by the standard-setting part.
1065.15(a) lists the emission constituents for which emission standards may be set. Smoke is not listed. Is this intentional?	Part 1065 does not include procedures for measuring smoke emissions.

II. Summary or Rulemaking Changes

Subpart A– Applicability and General Provisions

§1065.1 Applicability

Reference	Description	Source
(a) and (b)	We broadened applicability of Part 1065 to include Model year 2010 and later heavy-duty highway engines we regulate under 40 CFR Part 86. For earlier model years, manufacturers may use the test procedures in this part or those specified in 40 CFR Part 86, Subpart N.	
(g)	We added a reference to a location on our website where manufacturers may find additional information.	

§1065.2 Statements in applications and approvals

Reference	Description	Source
	We reiterated anyone's obligation to report truthful information to us and to reiterate our treatment of confidential business information.	§1068.101 §1068.10

§1065.5 Overview and relationship to standard setting parts

Reference	Description	Source
(a)	We revised the list of information needed from standard setting parts to conduct emissions testing according to this part. We revised the list to reflect a broader set of field testing requirements among the standard setting parts.	

§1065.10 Other procedures

Reference	Description	Source
(c)(1)	See Section 8.I.A	
(c)(3)	We provided guidance on how to gradually update your test procedures to eventually comply with Part 1065 based on §86.1306-07(c)(3).	§86.1306-07(c)
(c)(6)	Added allowance for manufacturers to ask to use earlier version of Part 1065 for 12 months after new provisions become effective.	

§1065.12 Approval of alternate procedures

Reference	Description	Source
	We incorporated and revised text from §86.1306-07(d). We revised §86.1306-07(d) text to provide additional guidance on how to use statistical tests and how to use the statistics for field testing.[(3)]	§86.1306-07(d)

§1065.15 Overview of procedures for lab and field testing

Reference	Description	Source
	We described lab testing and field testing in a similar context.	
(c)(1)	We described engine operation during lab and field testing.	
(c)(2)	We allowed both continuous and batch (e.g. bag, PM filter) sampling of emissions. In Part 1065 we incorporate specifications in Part 86, Part 89, and ISO 8178.	40 CFR Part 86 40 CFR Part 89 ISO 8178
(c)(3)	We allowed work determination via chemical balances of fuel and exhaust. This enables field testing without a direct torque measurement and without a flow measurement that is accurate to flow, but only linearly proportional to flow.	

§1065.20 Units of measure and overview of calculations.

Reference	Description	Source
(a)	We adopted the international system of units (SI) for all calculations. We revised Part 1065 to comply with a federal agency requirement to adopt SI.	15 CFR 1170
(a)	We adopted a molar basis for calculating ideal gas flows, which includes intake air, dilution air and raw and diluted exhaust. We deleted the volume and mass bases to eliminate the associated confusion from different datums of standard pressure and standard temperature.	
(f)	We revised equipment and measurement instrument specifications in Part 1065 to scale with our emissions standards and with the power of your engine. We revised these specifications to enable Part 1065 to be applicable across a wide range of emissions standards and engine sizes.	

§1065.25 Recordkeeping

Reference	Description	Source
	We added a minimum 1-year requirement to keep records, which may be superceded by requirements in the standard-setting part.	

Subpart B– Equipment Specifications

§1065.101 Overview

Reference	Description	Source
	We revised this subpart to only describe equipment specifications. We described measurement instrument specifications in their own subpart: Subpart C.	

§1065.110 Dynamometers and operator demand.

Reference	Description	Source
(a)	We revised dynamometer specifications for different applications, including duty cycles with motoring commands. We broadened specifications for standard setting parts that have motoring in their duty cycles. Based on comments from EMA, we described how to incorporate and/or simulate other work inputs and outputs in order to enable representative testing of engine subsystems such as turbocharger driven alternators, thermoelectric heat recovery devices, hybrid power trains, and other work inputs and outputs.	§86.1308 §89.306 ISO 8178-1 §7.2
(b) - (d)	We added text to explain how to handle engine accessories.	Proposed §1065.122
(e)	We described of how to control engine operator demand (e.g. throttle) to help ensure representative testing in the lab.	

§1065.120 Fuels and fuel temperature and pressure

Reference	Description	Source
(b)	We allowed manufacturers to specify the fuel temperature and pressure to the engine to help ensure representative testing in the lab. Based on comments from EMA, we described how to test an engine when a manufacturer does not specify certain pressures and temperatures.	ISO 8178-1 §6

§1065.122 Engine cooling and lubrication.

Reference	Description	Source
Title	We changed the section title to reflect the movement of accessory text to §1065.110.	
(a)	We describe how to cool an engine during testing.	§1065.501(c)(5)

§1065.125 Engine intake air

Reference	Description	Source
	We allowed emissions testing with a production intake air system to help ensure representative testing in the lab.	
(b)	We allowed use of a central barometer within 1 kPa of pressure at engine, instead of 0.1 % of point as in §86.1344(e)(4), which is overly stringent considering exhaust conditions are only held within 1.2 kPa.	§86.1344(e)(4)
(c)	We allowed engine manufacturers to specify a range of intake restriction, noting manufacturers' liability up to the maximum allowable restriction.	
(d)	We allowed the use of coolant as cool as 25 °C. We required the use of a cooler with a typical charge air volume to help ensure representative testing in the lab. We described how to cool the intake air consistent with §1065.10(c)(1).	8178-11 §5.2

§1065.127

Reference	Description	Source
	We added section to clarify the requirements for EGR systems.	

§1065.130 Engine exhaust

Reference	Description	Source
(a) through (d)	We scaled the exhaust system material, design, and component specifications in Part 86 Subpart N to enable Part 1065 to be applicable across a wide range of engine powers. In response to EMA comments, we maintained some absolute limits to laboratory exhaust system lengths.	CFR 86 Subpart N
(e)	We allowed forced aftertreatment cool-down based on guidance we issued in the past [(1)], [(2)].	§86.1335-90
(f)	We allowed engine manufacturers to use a range of exhaust restrictions based on the maximum recommended value, noting manufacturers' liability up to the maximum allowable restriction.	
(g)	We added specifications on how to route open crankcase emissions to accommodate standard setting parts that require open crankcase emissions measurements. Based on EMA comments, we allowed the use of conductive non-reactive non-metallic crankcase emissions tubing.	

§1065.140 Dilution for gases and PM.

Reference	Description	Source
(a)	We adopted a minimum dilution air temperature of 15 C from §86.1310-2007.[(3)]	§86.1310-2007

(b)	We recommended HEPA filtration, and we limited PM background if HEPA filtration is not used to improve PM measurement repeatability. Based on EMA comments we allowed a wider range of possible background emissions sampling options.	§86.1310-2007
(c)	We revised the CVS specifications, which we based on §86.1310-2007, to scale across a broad range of engine powers to enable Part 1065 to be applicable across a broad range of engine powers. Based on EMA comments, for our testing, we will maintain raw exhaust pressure control within a tighter tolerance that the default 1.2 kPa, if a manufacturer shows by data or engineering analysis that the tighter tolerance is needed to demonstrate compliance with the applicable standards and that the manufacturer also maintains the tighter tolerance during testing.	§86.1310-2007
(d)	We allowed constant-dilution ratio partial flow dilution samplers such as CVS secondary dilution systems. Previously we allowed this according to §86.1310-2007. We also allowed varying dilution ratio samplers for gaseous emissions, such as bag mini-diluters. We only allowed varying dilution ratio PFD systems for PM measurement for steady-state testing, including ramped modal testing. For transient duty cycle partial flow PM testing, we required prior approval from us according to §1065.10 and §1065.12.	§86.1310-2007
(e)	We specified temperature control during PM sampling the same as we specified in 86.1310-2007.(3)	§86.1310-2007

§1065.145 Gaseous and PM probes, transfer lines, and sample conditioning components

Reference	Description	Source
(b)	We defined a probe as only that section of a sampling system inside the raw or dilute exhaust duct. Note that this is a change from some of our other regulations where we allowed up to 1 meter of transfer line to be considered part of the probe.	
(b)	We allowed single port or multiport probes oriented in any direction for gaseous emissions sampling. Note that this is a change from some of our other regulations where we required certain probes and orientations for gas sampling. We allowed a wider variety of probes. because gas sampling is insensitive to the previous specifications.	
(b)	We required a more prescriptive design and orientation of for PM probes to ensure proper PM sampling. Based on European Union comments, we allowed the use of a “hat” type PM preclassifier on the end of PM probes as long as no other preclassifier is used downstream of the hat.	
(c)	We recommended how to install transfer lines, and we specified materials and temperatures of transfer lines based on §86.1310-2007, which were for diesel emissions sampling. We extended these specifications to include some spark-ignition engines.(3)	§86.1310-2007
(d)	We allowed sample conditioning components in-line with transfer lines based on §86.1310-2007.(3)	§86.1310-2007

§1065.170 Batch sampling for gaseous and PM constituents

Reference	Description	Source
(a) and (b)	We allowed gaseous batch sampling (e.g. bag sampling) based on Part 86 subpart B, and we revised batch sampling to include high temperature batch sampling (i.e. 191 C) based on 86.1310-2007.[3]	40 CFR Part 86 Subpart B §86.1310-2007
(c)	We required the same PM sample media (i.e filters) that we required in 86.1310-2007. In addition we required a more prescriptive filter specification for standards below 0.05 g/kW-hr. We required this to prevent gas-phase hydrocarbon adsorption onto the PM sample media, which would cause an incorrect result.[3]	§86.1310-2007
(c)	We added PM sample media and PM batch sampling specifications based on 86.1310-2007.[3] We added a PM surface concentration specification that limits the use of lower efficiency filters (that also have much lower pressure drop) to conditions where the PM concentration itself rapidly increases the efficiency of an initially less efficient filter. We essentially only allowed lower efficiency filters where PM testing at high PM standards cause initilly high efficiency (high pressure drop) filters to overload during a test.	§86.1310-2007

§1065.190 PM stabilization and weighing environments for gravimetric analysis

Reference	Description	Source
	We added PM stabilization and weighing environmental specifications based on §86.1312-2007.[3]	§86.1312-2007
(b)	We revised our recommended clean room specification from an obsolete federal standard to an ISO standard. We reduced the stringency of this recommendation by an order of magnitude to reflect best practices. We recommend deviating from the ISO standard to control air velocities near a balance.	§86.1312-2007
(c)	We adopted §86.1312-2007 specifications for temperature and humidity, and we added guidance on humidity control as a function of sulfuric acid in PM.[3]	§86.1312-2007
(d)	We adopted §86.1312-2007 specifications for temperature and humidity monitoring, but we are less prescriptive on the averaging of these parameters to allow for other acceptable system designs.[3]	§86.1312-2007
(e) and (f)	We adopted §86.1312-2007 specifications for balance installation and balance accessories and tools. We added recommendations based on previous guidance we issued to engine manufacturers. [1], [2]	§86.1312-2007

§1065.195 PM stabilization environment for in-situ analyzers

Reference	Description	Source
	We described the stabilization environment for in-situ PM analyzers, based on §86.1312 for gravimetric balances.[3] We expected that these instruments are likely to be used for field-testing PM measurement.	§86.1312-2007

(b)	We required HEPA filtration of equilibration air based on §86.1310.[3]	§86.1310-2007
(c)	We adopted a (42 to 52) °C equilibration temperature range to align in-situ PM measurement temperature with the PM sampling temperature in §86.1310-2007.[3] We adopted this temperature range to ensure fast equilibration and measurement in-situ. We added guidance on humidity control as a function of sulfuric acid in PM to align in-situ PM measurement guidance with gravimetric PM measurement guidance.	§86.1310-2007

Subpart C– Measurement Instruments

§1065.201Overview and general provisions

Reference	Description	Source
(d)	We allowed combining results of redundant measurements a single test based on §86.1310-2007.[3]	§86.1310-2007
(e)	We allowed using an instrument's response if it is greater than 100 % of the instrument's range, but we required additional testing, which is similar to §86.1338-2007.	§86.1338-2007
(f)	We required continuous analyzer signals to be matched to other continuous signals to improve repeatability and correlation between continuous sampling and batch sampling systems. We defined this matching as "dispersion".	

§1065.202 Data recording and control

Reference	Description	Source
(a)	We required minimum recording frequencies of data. We took into account recent research that indicated that significant changes in raw exhaust flow can occur over a period as short as 200 milliseconds.[4] Combined with the signal dispersion and time alignment that we required in §1065.201, we improved repeatability and correlation between continuous sampling and batch sampling.	

§1065.205 Performance specifications.

Reference	Description	Source

(a)	We recommended performance specifications for individual instruments, and we relied on the calibrations and performance checks in Subpart D to ensure that complete measurement systems perform adequately. We recommended performance specifications based on calibration requirements in 40 CFR 86 Subpart N, 40 CFR 89 Subpart D Appendix A, and ISO 8178-1. We defined accuracy, repeatability, and noise in Part 1065 Subpart D. We defined these values relative to emissions levels at a standard; not a lower value such as at 2 % of the standard, which is how some of our regulations previously specified accuracy. Essentially we allowed instruments to be matched to their application without forcing the use of higher performing instruments than required.	40 CFR 86 Subpart N 40 CFR 89 Subpart D Appendix A ISO 8178-1

§1065.210 Work input and output sensors

Reference	Description	Source
	We required the same speed and torque transducer as §86.1308-84. We added a figure to illustrate how to measure and account for auxiliary work inputs and outputs. We added recommendations on how to measure auxiliary work inputs and outputs including electrical, pump, and compressor work.	§86.1308-84

§1065.215 Pressure, temperature, and dewpoint transducers

Reference	Description	Source
	We recommended specific transducers as guidance for future procurement of such transducers.	

§1065.220 Fuel flow

Reference	Description	Source
	We allowed fuel flow to be directly measured or calculated by chemical balances of fuel, intake air, and exhaust, plus either an intake air flow or exhaust flow measurement. We allowed both options to help facilitate field testing and redundant measurements for lab testing.	§89.415 §89.416

§1065.225 Intake air flow

Reference	Description	Source
	We allowed intake air flow to be directly measured or calculated by chemical balances of fuel, intake air, and exhaust, plus either a fuel or exhaust flow measurement. We allowed both options to help facilitate field testing and redundant measurements for lab testing.	§89.414

§1065.230 Raw exhaust flow

Reference	Description	Source

	We allowed exhaust flow to be directly measured or calculated by chemical balances of fuel, intake air, and exhaust, plus either a fuel or intake air flow measurement. We allowed both options to help facilitate field testing and redundant measurements for lab testing. We created this section because new exhaust flow measurement technology has matured since we last revised our regulations. Combined with a new way to calculate brake-specific emissions that we allowed in §1065.650, a signal that is not absolutely calibrated--but just linearly proportional to exhaust flow--may be used to determine brake-specific emissions.	

§1065.240 Dilution air and diluted exhaust flow

Reference	Description	Source
	We required the same flow meters as in §86.1310-2007 for CVS systems, and we added a new CVS flow meter, an ultrasonic air flow meter, because this technology has matured since we last updated our regulations.(3) We added provisions for the common practice of using muliple CFVs in parallel in a CVS.	§86.1310-2007

§1065.245 Sample flow

Reference	Description	Source
	We required the same flow meter performance as specified in §86.1320-90, and we provided additional guidance on flow meter selection.	§86.1320-90

§1065.248 Gas divider

Reference	Description	Source
	We required the same flow meter performance as specified in §86.1314-94 for gas dividers. We also required a periodic gas divider linearity check.	§86.1314-94

§1065.250 Nondispersive infra-red CO analyzer

Reference	Description	Source
	We required the same CO measurement technology as Part 86 and Part 89. We allowed interference compensation that targets a 0.0% interference level.	§86.1322-84 §89.309

§1065.255 Nondispersive infra-red CO_2 analyzer

Reference	Description	Source
	We required the same CO_2 measurement technology as Part 86 and Part 89. We allowed interference compensation that targets a 0.0% interference level.	§86.1324-84 §89.309

§1065.260 Flame ionization detector analyzer for THC, NMHC, CH_4

Reference	Description	Source
	We required the same THC, NMHC measurement technology as Part 86 and Part 89 and we allowed a flame ionization detector to be coupled with a nonmethane cutter to facilitate CH_4 measurement according to ISO 8178-1 §16.4. We allowed interference compensation that targets a 0.0% interference level.	§86.1321-84 §89.309 ISO 8178-1 §16.4

§1065.265 Nonmethane cutter for CH_4

Reference	Description	Source
	We adopted the same nonmethane cutter performance specification as ISO 8178-1 to provide an alternative to the gas chromatograph we specified in §1065.267. We allowed this to facilitate continuous sampling of NMHC because the gas chromatograph is only applicable to batch (e.g. bag) measurements. We allowed interference compensation that targets a 0.0% interference level. Based on instrument manufacturer comments we allow humidification and oxygen dilution of a sample upstream of an NMC.	ISO 8178-1 §16.4

§1065.267 Gas Chromatograph for CH_4

Reference	Description	Source
	We adopted a gas chromatograph performance specification based on the methane analyzer descriptions in §86.1325-94 and §89.324. We allowed interference compensation that targets a 0.0% interference level.	§86.1325-94 §89.324

§1065.270 Chemiluminescent detector analyzer for NO_x

Reference	Description	Source
	We adopted the chemiluminescent detector analyzer specification in §86.1323-2007 §89.321. We allowed interference compensation that targets a 0.0% interference level.	§86.1323-2007 §89.321

§1065.272 Nondispersive ultraviolet analyzer for NO_x (NO and NO_2)

Reference	Description	Source
	We allowed the nondispersive ultraviolet detector NO_x analyzer because it has matured since we last updated our regulations. We allowed this technology to provide more measurement options, especially for field testing. We allowed interference compensation that targets a 0.0% interference level.	

§1065.280 Paramagnetic and magnetopneumatic detector analyzers for oxygen

Reference	Description	Source
	We adopted the paramagnetic detector analyzer specification for oxygen measurement from ISO 8178-1. We allowed interference compensation that targets a 0.0% interference level. We allowed the use of magnetopneumatic detectors.	ISO 8178-1 §8.9.4

§1065.284 Zirconia sensor for air-to-fuel ratio

Reference	Description	Source
	We allowed the zirconia air-to-fuel ratio sensor O_2 because it has matured since we last updated our regulations. We allowed this technology to provide more measurement options, especially for field testing. We allowed interference compensation that targets a 0.0% interference level.	

§1065.290 Gravimetric balance for PM

Reference	Description	Source
	We adopted the gravimetric balance for PM specification from §86.1312-2007.[3] We provided additional recommendations for features to consider when procuring a PM balance.	§86.1312-2007

§1065.295 Inertial balance for PM

Reference	Description	Source
	We allowed the inertial balance for PM because it has matured since we last updated our regulations. We allowed this technology to provide more measurement options, especially for field testing. We allowed interference compensation that targets a 0.0% interference level.	

Subpart D– Calibrations and verifications

§1065.301 Overview

Reference	Description	Source
(a) through (c)	We required calibrations and verifications on complete laboratory and field testing measurement systems, which include the probes, transfer lines, sample conditioning equipment, analyzers, and any analog to digital conversion and data acquisition devices. We replaced some calibrations in 40 CFR Part 86 and 40 CFR Part 89 with verifications.	
(d)	We required the use of NIST traceable standards, but we noted that you may ask to use other standards.	

§1065.305 Accuracy, repeatability, and noise verification.

Reference	Description	Source
	We defined accuracy, repeatability, and noise by the procedure that we specify for determining these values. We defined these values procedurally to prevent sellers and buyers of measurement systems from misinterpreting our specifications. We defined noise is a limit value, below which you may set recorded values to zero.	

§1065.306 Summary of periodic calibration and verifications

Reference	Description	Source
	We summarized how frequently each check in this subpart must be performed. We provided this summary so that laboratories and field test operators might use it as a template for part of a preventive maintenance plan.	

§1065.307 Linearity check.

Reference	Description	Source
	We replaced many calibrations that we required according to 40 CFR Part 86 and 40 CFR Part 89. We revised our approach toward instrument calibration because it did not apply to modern instruments that use other signals to correct for interferences.	

§1065.308 Continuous analyzer system response and updating-recording verification

Reference	Description	Source
	We added a verification to determine the response of analyzers and the alignment of any compensation signals. We added this check to verify that analyzer response and recording rate were matched and that other signals used to compensate for interferences were aligned with the primary emissions signal.	

§1065.309 Continuous analyzer uniform response verification

Reference	Description	Source
	We added a verification to determine that an analyzer had a uniform response so that it could be added correctly to other analyzer signals.	

§1065.310 Torque calibration

Reference	Description	Source
	We adopted the calibration specifications in §86.1308-84, §89.306, and §89.307, but we scaled them to the maximum torque of an engine to make Part 1065 applicable across a wide range of maximum engine torques.	§86.1308-84 §89.306 §89.307

§1065.315 Pressure, temperature, and dewpoint calibration.

Reference	Description	Source
	We provided guidance on pressure, temperature, and dewpoint calibration. We allowed laboratories to develop their own calibration procedures because of the diversity of measurement technologies. We relied on verifications such as the linearity check to ensure measurement system performance.	

§1065.320 Fuel flow calibration.

Reference	Description	Source
	We provided guidance on fuel flow calibration. We allowed laboratories to develop their own calibration procedures because of the diversity of measurement technologies. We relied on verifications such as the linearity check to ensure measurement system performance.	

§1065.325 Intake air flow calibration

Reference	Description	Source
	We provided guidance on intake air flow calibration. We allowed laboratories to develop their own calibration procedures because of the diversity of measurement technologies. We relied on verifications such as the linearity check to ensure measurement system performance.	

§1065.330 Exhaust flow check.

Reference	Description	Source
	We provided guidance on exhaust flow calibration. We allowed laboratories to develop their own calibration procedures because of the diversity of measurement technologies. We relied on verifications such as the linearity check to ensure measurement system performance.	

§1065.340 CVS calibration

Reference	Description	Source
	We adopted CVS calibration specifications from §86.1319-90 and especially §86.1319-90(e)[3], which specified calculations that assume isentropic compressible flow. We adopted molar flow reference signals for calibration to eliminate the use of standard pressure and temperature values, which have been a frequent source of confusion–especially across different regulations. We recognized that 40 CFR Part 86, 40 CFR Part 89, and ISO 8178-1 all have different standard conditions specified in different sections.	§86.1319-90
(e)	We adopted PDP calibration specifications from §86.1319-90, but we reformulated the equations to make them easier to understand.	§86.1319-90

(f)	We adopted CFV calibration specifications from §86.1319-90 CFV, but we reformulated the calibration to take into account isentropic compressible flow. We specified the new calibration formulation to extend use of the calibration data to a wider range of molar masses of an exhaust mixture. We allowed assumptions to be made in order to reduce the new formulation to the formulation in §86.1319-90, but we restricted use of the §86.1319-90 formulation to a range of molar masses of flow. We provided similar guidance to this effect in the past.[(1),(2)] We specified how to calibrate multiple CFVs in parallel.	§86.1319-90
(g)	We adopted the SSV calibration in §86.1319-90, but we used a molar reference signal.	§86.1319-90

§1065.341 Propane check

Reference	Description	Source
	We adopted the propane check of §1319-90(f), but we extended its use to check secondary dilution systems, and we added an option to use a flow-based reference instead of the gravimetric reference in §1319-90(f) . We recognized that the flow-based reference has been used successfully in light-duty CVS applications, and we allowed this reference to provide more options to engine dynamometer CVS laboratories. For the flow-based reference we required compensation for the non-ideal gas behavior of pure compressed propane.	§1319-90(f)

§1065.345 Vacuum side leak check

Reference	Description	Source
	We adopted the leak checks from §86.1337-90 and 89.316, but we revised this check to include two step-by-step procedures to perform the check. We allowed either form of the check to provide more options to engine dynamometer laboratory operators and field test system operators.	§86.1337-90 §89.316

§1065.350 CO_2 NDIR analyzer H_2O interference check.

Reference	Description	Source
	We adopted the performance specification in §89.318, and we described a step-by-step procedure for this check.	§89.318

§1065.355 CO NDIR analyzer CO_2 and H_2O interference check.

Reference	Description	Source
	We adopted the performance specification in §89.318, and we described a step-by-step procedure for this check.	§89.318

§1065.362 FID calibration, response optimization, CH_4 response factor determination and FID flow check

Reference	Description	Source
	We adopted the performance specification in §89.318, and we described a step-by-step procedure for this check. We allowed a simplified check that when completed successfully, significantly reduced the burden of the complete check. We currently use this simplified check successfully at our EPA labs; therefore, we allowed others to use it.	§89.318

§1065.362 Non-stoichiometric raw exhaust FID O_2 interference verification

Reference	Description	Source
	We added a FID O_2 interference verification for hydrocarbon sampling from Non-stoichiometric raw exhaust. The verification was based on ISO 8178.	§89.318 ISO 8178-1 §8.8.3

§1065.365 Nonmethane cutter penetration determination.

Reference	Description	Source
	We adopted a revised version of the nonmethane cutter efficiency determination, which is specified in ISO 8178-1 §8.8.4. We revised this section to include a more prescriptive step-by-step procedure, and a simplified calculation to detemine nonmethane cutter penetration if two FIDs are used to determine NMHC.	ISO 8178-1 §8.8.4

§1065.370 CLD H_2O and CO_2 interference check

Reference	Description	Source
	We adopted the CLD H_2O and CO_2 interference check from §86.1323-2007.[(3)] Based on instrument manufacturer comments, we recommended humidifying the calibration gases to the humidity expected during testing.	§86.1323-2007

§1065.372 NDUV NO_x analyzer verification

Reference	Description	Source
	We required a verification specifically for nondispersive ultraviolet detector NO_x analyzers. We required this check because of its limitations. We required this check to ensure that these instruments are designed and operated appropriately.	

§1065.376 Thermal chiller NO_2 penetration check

Reference	Description	Source
	We required this verification if a thermal chiller is used upstream of an NO_2 detector or NO_2 to NO converter. We required this check because of its limitations. We required this check to ensure that these instruments are designed and operated appropriately.	

§1065.378 NO_2 to NO converter check

Reference	Description	Source
	We adopted the NO_2 to NO converter efficiency specifications in §86.1323-84 and ISO 8178-1 §8.7, however we scaled performance to the level of NO_2 expected during testing. We scaled this check to make it less stringent for emissions tests that are not affected by its performance and more stringent for emissions tests that are significantly affected by its performance.	§86.1323-84 ISO 8178-1 §8.7

§1065.390 PM weighing process verification

Reference	Description	Source
	We adopted the PM weighing process verification from §86.1312-2007.[3], however we scaled this check to the PM emissions expected at the standard. This prevents an unnecessarily stringent requirement for PM weighing.	§86.1312-2007

§1065.395 Inertial PM balance specifications

Reference	Description	Source
	We added a section that describes how to verify the performance of an inertial PM balance.	§86.1312-2007

Subpart E– Engine selection, preparation, and maintenance.

§1065.405 Test engine preparation and maintenance.

Reference	Description	Source
	We required specifications for engine selection, preparation, and maintenance; however we stated that any requirements in any standard-setting part take precedence over the specifications in this subpart.	
	We allowed a default value 125 hours of engine service accumulation for compression-ignition engines without emissions measurement.	
	We allowed the simulation of production governors for constant-speed engines.	
	We described how to test engines that normally have evaporative emissions control systems (i.e., canisters) attached to them.	

Subpart F– Running an emissions test in a laboratory

§1065.501 Overview

Reference	Description	Source
	We summarized all of the step-by-step procedures for running an emissions test in a laboratory, and we reiterated that standard setting parts specify other information required to run an emissions test. We required variable speed and constant speed engines subject to steady-state, ramped modal, and transient testing to be tested according to this subpart, including any cold-start testing, hot-start testing, and warmed-up running engine testing. We adopted procedures in §86.1327 through §86.1337 [(3)], §89.404 through §89.408 and ISO 8178-1 §11. We added requirements and options to the specifications in §86.1327 through §86.1337 [(3)], §89.404 through §89.408 and ISO 8178-1 §11.	§86.1327-§86.1337 §86.1341 §89.404-§89.408 §89.410 ISO 8178-1 §11

§1065.510 Engine mapping

Reference	Description	Source
	We adopted §86.1332-90 for variable speed engines. We added new requirements for constant-speed engines, which rely on the engine's governor or simulated governor to select the engine speed during an emissions test. We required this to ensure that constant speed engines are tested in a representative way. We describe how to map when an engine is configured with auxiliary inputs and outputs. We described how to declare certain speeds and torques, and when measured speeds and torques must be used instead of declared speeds and torques.	§86.1332-90

§1065.512 Duty cycle generation.

Reference	Description	Source
	We adopted §86.1333-90, §89.410, ISO 8178-1 §11.5, and ISO 8178-1 §11.7 to combine the requirements for steady-state, ramped modal, and transient test cycle generation. We allowed constant speed engines to operate at the speed selected by the engine's governor or simulated governor. We specified how to process mapping data to generate duty cycles for a specific engine.	§86.1333-90, §89.410, ISO 8178-1 §11.5, ISO 8178-1 §11.7

§1065.514 Cycle validation criteria

Reference	Description	Source

	We adopted the cycle validation criteria of §86.1341-90, but we revised the point omission criteria easier to understand. We revised some of the statistics to reflect the dependence of power on speed and torque. We revised the statistics to reflect the capabilities of modern dynamometer and operator demand control systems. We required only torque validation criteria for constant speed engines because we allow constant speed engines to be governed by their governor or simulated governor during emissions testing.	§86.1341-90

§1065.520 Pre-test verification procedures and pre-test data collection

Reference	Description	Source
	We adopted §86.1330-90, §86.1334-84 and §89.406, including the preconditioning cycle we added to §86.1330-90 in January of 2001.[3] We replaced the hydrocarbon overflow zero and span procedure with a hydrocarbon sampling system contamination check. Up to a certain amount of contamination, we allowed emissions results correction by subtracting the contamination determined with an overflow zero check performed after an analyzer port zero and span. We required this to prevent excessive hydrocarbon contamination from biasing results. We allowed some contamination to be appropriately subtracted from emissions results, which is how the original overflow procedure worked, except that it had no limits on contamination. We required this procedure to improve test repeatability.	§86.1330-90 §86.1334-84 §89.406

§1065.525 Engine starting, restarting and shutdown

Reference	Description	Source
	We adopted §86.1334-84, but we have simplified the requirements because §86.1334-84 described some starting procedures with obsolete engine components. We revised §86.1334-84 to achieve the same intent. We specified a procedure for restarting an engine if it stalls during a discrete-mode steady-state test.	§86.1334-84

§1065.530 Emission test sequence.

Reference	Description	Source
	We adopted §86.1337-90, §89.407, and ISO 8178-1 §11.7.1 and combined them to include PM sampling, continuous and batch sampling, and raw and dilute sampling. We required procedures to check for analyzer drift. We allowed collecting and correcting for background emissions in dilution air. We required procedures for cold-starts, hot-starts, soak periods, and hot running tests. We specified how to cool down aftertreatment systems. We recommended verifying gas analyzer zero and span by using a mid-span reference gas. We specified how to retest a constant speed engine when it does not maintain constant speed at the highest torque.	§86.1337-90, §89.407, ISO 8178-1 §11.7.1.

§1065.545 Validation of proportional flow control for batch sampling

Reference	Description	Source
	We adopted the performance specification of §86.1310-2007 for PM sampling systems.[3] We incorporated additional options for validating proportional sampling based on the principles of CVS sampling.	§86.1310-2007

§1065.550 Emissions analyzer range and drift validation.

Reference	Description	Source
	We adopted the performance specifications in §86.1340-90, §89.406, and ISO 8178-1 §11.8. We allowed for correction of a limited amount of analyzer drift. We developed this procedure jointly with measurement instrument manufacturers and engine manufactures.	§86.1340-90, §89.406, ISO 8178-1 §11.8.

§1065.590 PM sample preconditioning and tare weighing

Reference	Description	Source
	We adopted §86.1312-2007.[3] We added an option to perform substitution weighing, which has been used in ambient PM sampling successfully–especially when PM concentrations are very low.	§86.1312-2007

§1065.595 PM sample post-conditioning and total weighing.

Reference	Description	Source
	We adopted §86.1312-2007.[3] We added an option to perform substitution weighing, which has been used in ambient PM sampling successfully–especially when PM concentrations are very low.	§86.1312-2007

Subpart G– Calculations and data requirements

§1065.601 Applicability.

Reference	Description	Source
	We consolidated calculations that were specified multiple times in this part (i.e. Part 1065). For example we consolidated statistical calculations for instrument performance, alternate system approval, and duty cycle validation in §1065.602.	
	We adopted SI units for all calculations, except for one set of example calculations in §1065.640 where we showed how to convert different reference flow meter signals to molar reference signals.	
	We provided completely worked-out examples for every calculation, including conversion factors for various engineering units.	

§1065.602 Statistics

Reference	Description	Source
	We consolidated statistics calculations that were specified multiple times in this part (i.e. Part 1065). For example we consolidated statistical calculations for instrument performance, alternate system approval, and duty cycle validation. We added examples on how to calculate flow-weighted average concentrations at a given standard for various engines. We provided these examples because we scale many measurement instrument specifications to this value tto ensure that Part 1065 is applicable across a wide range of emissions standards and sampling techniques (e.g. raw, dilute, continuous, and batch sampling)	

§1065.610 Test cycle generation

Reference	Description	Source
	We consolidated all of the calculations for discrete-mode, ramped modal, and transient test cycle generation from §86.1333-90, §89.410, ISO 8178-1 §11.5, and ISO 8178-1 §11.7. We allowed constant speed engines to operate at the speed(s) selected by the engine's governor or simulated governor.	§86.1333-90, §89.410, ISO 8178-1 §11.5, ISO 8178-1 §11.7

§1065.630 1980 International gravity formula

Reference	Description	Source
	We adopted this formula to prescribe what we meant in previous regulations when we required that you account for local effects on gravity at your location, such as in § 86.1308-84(e)(1)(i). We recommended to use this formula when conducting dynamometer torque calibration and torque linearity checks according to §1065.308 and §1065.310.	§86.1308-84(e)(1)(i)

§1065.340 CVS calibration equations

Reference	Description	Source
	We adopted CVS calibration calculations from §86.1319-90 and especially §86.1319-90(e)[(3)], which specified calculations that assume isentropic compressible flow. We adopted molar flow reference signals for calibration to eliminate the use of standard pressure and temperature values, which have been a frequent source of confusion–especially across different regulations. We recognized that 40 CFR Part 86, 40 CFR Part 89, and ISO 8178-1 all have different standard conditions specified in different sections.	§86.1319-90
(b)	We adopted PDP calibration calculations from §86.1319-90, but we reformulated the equations to make them easier to understand.	§86.1319-90

(c)	We adopted CFV calibration calculations from §86.1319-90 CFV, but we reformulated the equations to take into account isentropic compressible flow. We specified the new calibration equation to extend use of the calibration data to a wider range of molar masses of an exhaust mixture. We allowed assumptions to be made in order to reduce the new equation to the equation in §86.1319-90, but we restricted use of the §86.1319-90 equation to a range of molar masses of flow. We provided similar guidance to this effect in the past.[1],[2] We provided a description of how to account for Reynolds number viscosity effects. We reformulated the statistical tolerance criteria for an acceptable calibration equation. We described how to calibrate multiple CFVs in parallel.	§86.1319-90
(d)	We adopted the SSV equation in §86.1319-90, but we rearranged it to use a molar reference signal.	§86.1319-90

§1065.340 CVS flow rate equations

Reference	Description	Source
	We adopted CVS flow rate calculations from §86.1319-90 and especially §86.1319-90(e)[3], which specified calculations that assume isentropic compressible flow. We adopted molar flow rates to eliminate the use of standard pressure and temperature values, which have been a frequent source of confusion–especially across different regulations. We recognized that 40 CFR Part 86, 40 CFR Part 89, and ISO 8178-1 all have different standard conditions specified in different sections.	§86.1319-90
(a)	We adopted PDP flow rate calculations from §86.1319-90, but we reformulated the equations to make them easier to understand.	§86.1319-90
(b)	We adopted CFV flow rate calculations from §86.1319-90 CFV, but we reformulated the equations to take into account isentropic compressible flow. We specified the new flow rate equation to extend use of the flow meter to a wider range of molar masses of an exhaust mixture. We allowed assumptions to be made in order to reduce the new flow rate equation to the equation in §86.1319-90, but we restricted use of the §86.1319-90 flow rate equation to a range of molar masses of flow. We provided similar guidance to this effect in the past.[1],[2] We described how to calculate total CVS flow through multiple CFVs in parallel.	§86.1319-90
(c)	We adopted the SSV flow rate equation in §86.1319-90, but we rearranged it to calculate a molar flow rate.	§86.1319-90

§1065.645 Amount of water in an ideal gas.

Reference	Description	Source

	We consolidated several other sections' requirements to calculate this value, such as those sections that required an amount of water removed correction, a buoyancy correction, a background emissions correction, chemical balances of fuel, exhaust, and intake air, and flowmeter calibrations and verifications. We specified this calculation only once in Part 1065 to ensure that this value is calculated in only one way. We adopted an internationally accepted formulation for this value from the World Meteorological Organization (WMO), and we verified that our formula is consistent with that of Gratch because some recent versions of WMO publications have had some errors in this formula.	

§1065.650 Emissions calculations

Reference	Description	Source
	We adopted emissions calculations from §86.1342-94, §89.418, §89.419, and ISO 8178-1 §12 though §16 to combine steady-state, ramped modal, and transient testing calculations. We included raw, dilute, continuous, and batch sampling. We added a new way to calculate brake-specific emissions based on the ratio of a value proportional to an emissions mass and another value similarly proportional to work.	§86.1342-94, §89.418, §89.419, ISO 8178-1 §12 though §16.

§1065.655 Chemical balances

Reference	Description	Source
	We adopted the chemical balances from §89.418 and ISO 8178-1 Annexe A. We specified how to use chemical balances to determine the amount of water in exhaust, the amount of carbon-containing emissions in exhaust, and the dilution fraction of dilution air in diluted raw exhaust. We specified how to use these formulas to calculate raw exhaust flow based on intake air or fuel flow.	§89.418 ISO 8178-1 Annexe A

§1065.657 Drift validation and correction.

Reference	Description	Source
	We adopted the drift performance specification from §86.1340-90, §89.406, and ISO 8178-1 §11.8. We added a drift correction to account for a limited amount of analyzer drift. We developed this procedure with instrument manufacturers and engine manufactures. We added this correction to improve repeatability.	§86.1340-90, §89.406, ISO 8178-1 §11.8.

§1065.659 Removed water correction.

Reference	Description	Source
	We adopted the corection in §86.1342-90, §89.418, , ISO 8178-1 A.2.4, but we have revised it to take into account any condensation that occurs upstream of a flow meter.	§86.1342-90, §89.418, ISO 8178-1 A.2.4

§1065.660 THC and NMHC determination

Reference	Description	Source
	We adopted the THC and NMHC determination from §86.1342-94, ISO 8178 §15.4. We allowed multiplying THC by 0.98 as an approximation for NMHC. We replaced the hydrocarbon overflow zero and span procedure with a hydrocarbon sampling system contamination check. Up to a certain amount of contamination, we allowed emissions results correction by subtracting the contamination determined with an overflow zero check performed after an analyzer port zero and span. We required this to prevent excessive hydrocarbon contamination from biasing results. We allowed some contamination to be appropriately subtracted from emissions results, which is how the original overflow procedure worked, except that it had no limits on contamination. We required this procedure to improve test repeatability.	§86.1342-94, ISO 8178 §15.4

§1065.665 NMHCE determination

Reference	Description	Source
	We adopted the THCE and NMHCE determination from §86.1342-94 and ISO 8178-1 §15.5 and §15.6. We allowed multiplying THC by 0.98 as an approximation for NMHC. We replaced the hydrocarbon overflow zero and span procedure with a hydrocarbon sampling system contamination check. Up to a certain amount of contamination, we allowed emissions results correction by subtracting the contamination determined with an overflow zero check performed after an analyzer port zero and span. We required this to prevent excessive hydrocarbon contamination from biasing results. We allowed some contamination to be appropriately subtracted from emissions results, which is how the original overflow procedure worked, except that it had no limits on contamination. We required this procedure to improve test repeatability.	§86.1342-94, ISO 8178-1 §15.5 and §15.6

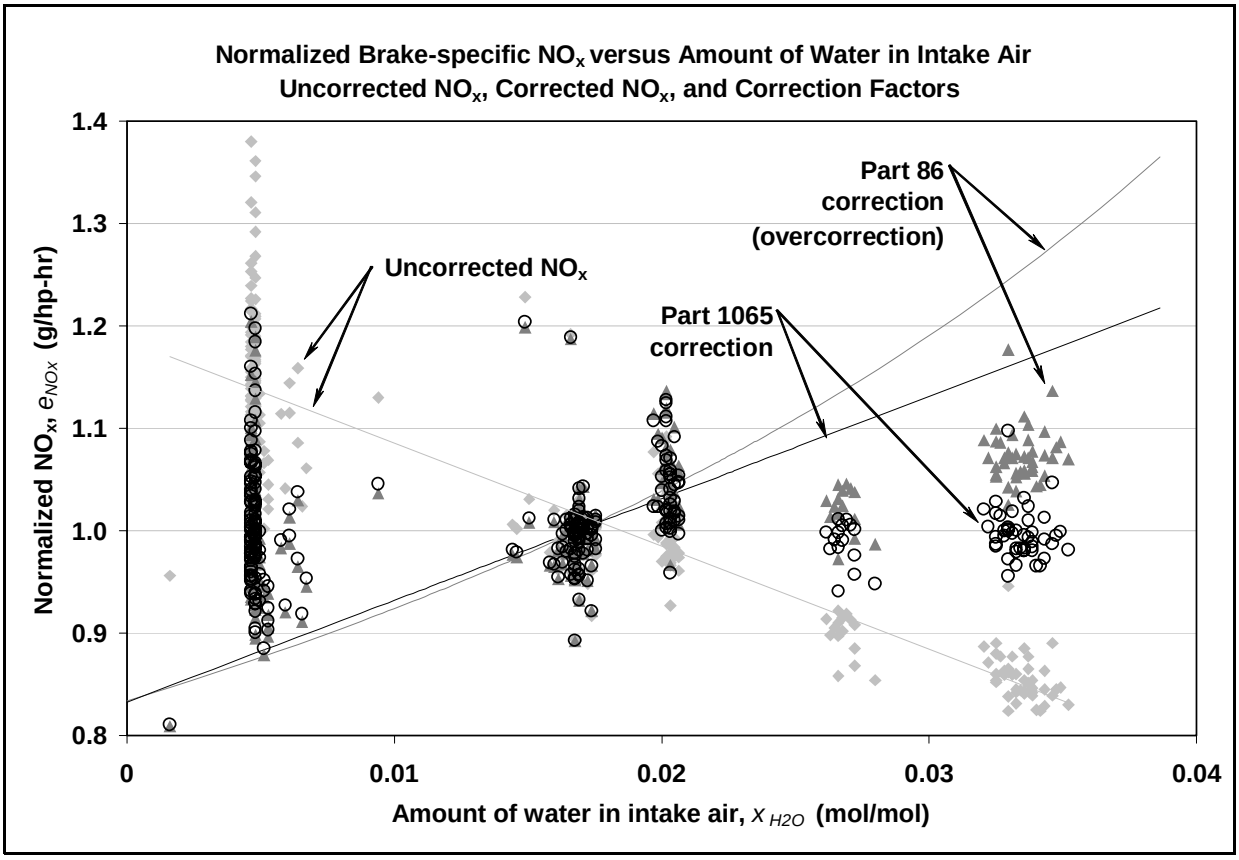
§1065.667 Dilution air background correction

Reference	Description	Source
	We adopted the dilution air background correction from §86.1342-94, §89.420, and ISO 8178-1 §13.5. We recommend when to remove background emissions from dilution air.	§86.1342-94, §89.420 ISO 8178-1 §13.5

§1065.670 NO_x intake air humidity correction

Reference	Description	Source

	As is the case for all other provisions in Part 1065, we specified that any NOx humidity corrections in the standard-setting parts may take precedent over the correction in Part 1065. For the Part 1065 correction, we adopted the NO_x intake air humidity correction from §86.1342-94, §89.418, and ISO 8178-1 §13.4, but we revised the equation. We used a linear fit to a recent set of comprehensive data collected for the purpose of determining a NO_x humidity correction factor.[5] We generated the equation with a least squares linear regression line of more than 300 data points generated with six different engines over a broad range of humidity conditions. We forced the correction to pass through a value of one (1) at 75 grains of water per pound of dry air (10.71 g/kg dry air) to align it with the correction from §86.1342-94, §89.418, and ISO 8178-1 §13.4. This correction is significantly more consistent with computer NO_x models versus the previous correction. For example, from the range of (0 to 95) % relative humidity at 30 °C ambient temperature, the NO_x correction from §86.1342-94, §89.418, and ISO 8178-1 §13.4 was 1.70 while the linear correction we adopted was 1.48. A computer NO_x model, ALAMO,[6] predicted a correction of 1.42 for an engine at rated conditions across the same humidity. For this example the linear correction is 4 % higher than the model, but the correction from §86.1342-94, §89.418, and ISO 8178-1 §13.4 is 20 % high. We based this revised equation on data and verified it with a computer model to improve test repeatability. Below is an illustration of the uncorrected data[5], the data corrected according to §86.1342-94, §89.418, and ISO 8178-1 §13.4,[5] the data corrected to the equation we adopted in Part 1065, and lines depicting the corresponding correction factors.	§86.1342-94, §89.418, ISO 8178-1 §13.4.



§1065.672 CLD quench check calculations.

Reference	Description	Source
	We adopted the chemiluminescent detector Nox analyzer quench check performance specification from §86.1323-2007.(3)	§86.1323-2007

§1065.690 PM sample media buoyancy correction.

Reference	Description	Source
	We adopted the bu §86.1312-2007,(3) but we eliminated the temperature and humidity portions of the correction because we specified tight humidity and temperature control in the PM weighing environment. We determined that making corrections based on small changes in temperature and humidity might induce error due to the measurement error associated with them. We revised the correction so that it only accounts for changes in barometric pressure, which is the dominant parameter that causes a change in PM sample media buoyancy. We allowed the optional use of humidity and temperature buoyancy corrections, however.	§86.1312-2007.

§1065.695 Required data.

Reference	Description	Source
	We adopted the data requirements from §86.1344-94, and we combined these with required data from various standard setting parts and our most recent application formats for certification.	§86.1344-94 EPA's most recent application formats for certification.

Subpart H– Engine fluids, test fuels, analytical gases, and other calibration standards

§1065.701 General requirements for test fuels

Reference	Description	Source
	We are moving the general requirements for test fuels that were originally in Part 1065 to Subpart H	Old Subpart C of Part 1065
(a)	Add a clarification that §1065.10(c)(1) does not apply for test fuels.	
(d)	Add allowance to use other standard methods specified in 40 CFR Part 80 to measure fuel properties.	
(e)	Add examples of typical ASTM fuel specifications for in-use fuels.	

§1065.703 Distillate diesel fuel

Reference	Description	Source
	We deleted specific ranges of fuel parameters for diesel service accumulation fuel, which is different from §86.1313-2007. We adopted a 10 mg/kg minimum limit for aromatics, which is the same as the nonroad diesel engine Tier IV rule,[7] instead of 25 mg/kg, which was in §86.1313-2007. We eliminated the specification for Cetane Index because it is obsolete and because we require Cetane Number, which is a more accurate determination of Cetane.	§86.1313-2007

§1065.705 Residual fuel [reserved]

Reference	Description	Source
	We reserved this section for a future marine residual fuel specification.	

§1065.710 Gasoline.

Reference	Description	Source
	We adopted the test fuels that were originally in Part 1065.	Old Part 1065

§1065.715 Natural gas.

Reference	Description	Source
	We adopted the test fuels that were originally in Part 1065.	Old Part 1065

§1065.720 Liquefied propane gas

Reference	Description	Source
	We adopted the test fuels that were originally in Part 1065.	Old Part 1065

§1065.740 Lubricants.

Reference	Description	Source
	We adopted the lubricant specification in §89.330.	§89.330

§1065.745 Coolants.

Reference	Description	Source
	We adopted the coolant specification in §86.1327-98	§86.1327-98

§1065.750 Analytical gases.

Reference	Description	Source
	We adopted the analytical gas specifications in §86.1314-94 and §89.312, however, we allowed zero gas contamination to scale with the concentration expected at the standard. In some cases this will be a decrease in stringency, however, we significantly increased the stringency on the level of contaminants when very low levels of emissions are expected at the standard. We adopted these changes to improve test repeatability.	§86.1314-94, §89.312
(a)(2)	Add recommendation to use representative level of O2 in FID gas	
(b)	Add allowance to relabel gas standards	
(d)	Add specific requirement to use good engineering judgment when handling and storing gases to maintain stability.	

§1065.790 Mass standards

Reference	Description	Source
	We adopted the dynamometer calibration weight specifications in §86.1308-84 and §89.305. We specified new requirements for calibration weights for PM balances.	§86.1308-84 §89.305

Subpart I– Testing with oxygenated fuels.

§1065.801 Applicability.

Reference	Description	Source
(b)	Added paragraph to clarify that Subpart I applies for any testing that requires measurement of alcohols or carbonyls.	

§1065.805 Sampling systems.

Reference	Description	Source
(a)(-(d)	Specify requirements that were described in 40 CFR part 86. We also allow a photo-acoustic analyzer to be used to measure methanol and ethanol in exhaust. We provided similar guidance in the past,[8] which is consistent with regulations published by the California Air Resources Board.[9]	
(e)	Allow collection of a single weighted sample.	
(f)	Allow use of CARB NMOG procedures.	

§1065.845 Response factor determination.

Reference	Description	Source
	Add section to describe how to determine FID responses to oxygenated compounds.	§86.1321-90

§1065.850 Calculations.

Reference	Description	Source
	We relocated the calculations to §1065.665.	

Subpart J– Field Testing

§1065.901 Applicability

Reference	Description	Source
	We applied this subpart to engines with field testing requirements, including manufacturer-run on-vehicle testing requirements. We also allowed the equipment specified in this subpart to be used for laboratory testing. Refer to the standard setting part for applicability.	
	We superceded the current field testing subpart in Part 1065 with a new subpart.	

§1065.905 General provisions.

Reference	Description	Source
	We provided a list of information needed from standard setting parts to conduct field testing according to this part. We indicated that much of this subpart relies on specifications in other subparts of Part 1065.	

§1065.910 Field testing equipment

Reference	Description	Source
	We specified the equipment we require for field testing. We included equipment for routing exhaust for sampling and flow measurement, mounting hardware, and power supplies.	

§1065.915 Measurement instruments.

Reference	Description	Source
	We specified the measurement instruments we require for field testing by referring to Subpart C. We explained how to use signals from an engine's electronic control module. We specified how to use redundant measurements. We specified how to address the effects of ambient conditions on field test measurement systems. We specified how to estimate torque in the field.	

§1065.920 Calibrations and verifications

Reference	Description	Source
	We referred to Subpart D for verifications. We specified an overall field test system verification against a laboratory that meets Part 1065.	

§1065.925 Measurement instrument and equipment preparation

Reference	Description	Source
	We specified a step-by-step set of instructions for preparing a field test measurement system for use. We based the instructions on a generic field test system by drawing on our own field testing experience and reports outlining similar instructions.[(10), (11)]	

§1065.930 Engine starting, restarting, and shutdown

Reference	Description	Source
	We specified a step-by-step set of instructions for engine starting, restarting and shutdown based on lab testing, except that an engine may be shut down and restarted any number of times during a field test.	

§1065.935 Emission test sequence.

Reference	Description	Source
	We specified a step-by-step set of instructions for running a field test. We based the instructions on a generic field test system by drawing on our own field testing experience and reports outlining similar instructions.[(10), (11)]	

§1065.940 Emission calculations.

Reference	Description	Source
	We specified the same emissions calculations as used in a laboratory according to §1065.650. We noted that information from the standard setting parts are required to define individual test intervals within a field test.	

Subpart K– Definitions and other reference information

§1065.1001 Definitions

Description	Regulatory Text	Reference
We added these definitions to clarify that they have the specified conventional meaning.	300 series stainless steel, Aerodynamic diameter, Allowed procedures, Alternate procedures, Applicable standard, Aqueous condensation, Atmospheric pressure, Auto-ranging, C1 equivalent (or basis), Confidence interval, Coriolis meter, Dewpoint, Dispersion, Drift, Duty cycle, Electronic control module, Engine governed speed, Fall time, Flow-weighted mean, HEPA filter, Hydraulic diameter, Hydrocarbon, Linearity, Noise, Open crankcase emissions, Partial pressure, Percent, Portable emission measurement system, Procedures, Proving ring, PTFE, Regression statistics, Repeatability, Rise time, Roughness, Round, Shared atmospheric pressure meter, Shared humidity measurement, Special procedures, Specified procedures, Standard deviation, Storage medium, Test interval, Useful life, Variable-speed engine, Vehicle, We, and Zero gas.	
We added or revised these definitions to have the meaning specified in other recently adopted or revised parts of Subchapter U.	Adjustable parameter, Aftertreatment, Auxiliary emission-control device, Designated Compliance Officer, Discrete-mode, Emission-control system, Emission-data engine, Engine family, Exhaust-gas recirculation, Fuel type, Good engineering judgment, Idle speed, Intermediate test speed, Nonmethane hydrocarbon equivalent, Nonroad engine, Ramped-modal, Scheduled maintenance, Spark-ignition, Steady-state, and Total hydrocarbon equivalent.	
We deleted these terms which are no longer used in Part 1065.	Engine-based, Equipment-based, Fuel system, Revoking a certificate, Suspending a certificate, Wide-open throttle.	

§1065.1001 Definitions - continued.

Reference	Description	Source
Brakepower	Revised to clarify how accessory power is treated.	
Calibration and Verification	Verification is added to distinguish the term from calibration.	

Constant-speed operation	Elimination of examples.	
NIST traceable	Add definition and include allowance to use international equivalents with approval.	
Oxides of nitrogen	See Section 8.I.B.	
Tolerance	Add definition to clarify meaning of ranges of accuracy/precision.	

§1065.1005 Symbols, abbreviations, acronyms, and units of measure.

Reference	Description	Source
	We defined the symbols, abbreviations, acronyms, and units of measure that we use in Part 1065. We minimized repeating symbols for different quantities. We used symbols consistent with ISO 31. We revised symbols, abbreviations, acronyms, and units of measure to reflect the use of Part 1065 test procedures and the application of SI units, and molar flow rates.	

§1065.1010 Reference materials.

Reference	Description	Source
	We revised Part 1065 reference materials to include new ASTM, ISO and NIST publications. We also added a reference to California's NMOG Test Procedures.	

References for Chapter 8

(1) Letter from EPA to EMA, "Guidance Regarding Test Procedures for Heavy-Duty On-Highway and Non-Road Engines", Gregory Green, Division Director, Certification and Compliance Division, Office of Transportation and Air Quality, U.S. Environmental Protection Agency, December 3, 2002.

(2) "Supporting Document for Letter to EMA Regarding Acceptable Interpretations and Alternatives to the Rules and Regulations published in the Federal Register, Vol. 66, No. 12, Thursday, January 18, 2001", Matthew Spears, Assessment and Standards Division, Office of Transportation and Air Quality, U.S. Environmental Protection Agency, December 3, 2002.

(3) "Description of Changes to the Test Procedures Specified in 40 CFR Part 86 for Model Year 2007 and Later Heavy-Duty Engines", Air Docket A-99-06, IV-B-11, Matthew Spears, Assessment and Standards Division, Office of Transportation and Air Quality, U.S. Environmental Protection Agency, December 6, 2000.

(4) "Performance of Partial Flow Sampling Systems Relative to Full Flow Cvs for Determination of Particulate Emissions Under Steady-State and Transient Diesel Engine Operation", Khalek Imad A., et al., Southwest Research Institute, Society of Automotive Engineers Technical Paper 2002-01-1718, May 2002.

(5) "Heavy-Duty Diesel Engine NO_x and PM Correction Factors", Project 08-2597, Southwest Research Institute, San Antonio, TX, July 27, 1999.

(6) "A PC-Based Model for Predicting Nox Reductions in Diesel Engines", Dodge, Lee G., Leone, Douglas M., Naegeli, David W., Dickey Daniel, W., Swenson, Kendall R., Southwest Research Institute Society of Automotive Engineers Technical paper 962060, 1996.

(7) Nonroad Diesel Tier IV Rule, EPA420-F-04-037, May 2004.

(8)"Approval of the Request to Use the Innova 1312 Photoacoustic Multi-gas Monitor in the Measurement of Ethanol in Exhaust and Evaporative Emissions", Gregory Green, Division Director, Certification and Compliance Division, Office of Transportation and Air Quality, U.S. Environmental Protection Agency, January 25, 2002.

(9) Use of Innova Photoacoustic Multi-gas Monitor to Measure Ethanol Exhaust and Evaporative Vehicle Emissions", Mail-Out #MSO 2000-08, Summerfield, R.B, Mobile Source Operations Division, California Air Resources Board, June 29,2000.

(10) "On-vehicle, In-use, Heavy Duty Diesel Engine (HDDE) Protocol", Czachura Barry S. J., Analytical Engineering Incorporated, September 2, 2003.

(11) "Protocol for Measurement of Air Pollutant Emissions from Ferry Boats", Culnane Mary, San Francisco Water Transit Authority, August 19, 2002.

Chapter 9: Marine Spark-Ignition Engines (40 CFR part 91)

The following table describes the comments related to the regulation of marine spark-ignition engines in 40 CFR part 91, with our response to each of these comments. All the comments came from Mercury Marine or the National Marine Manufacturers Association.

Issue	Response
91.707: Mercury and NMMA expressed a need for an exemption that would allow them to import engines that are covered by a certificate, but are not yet in their certified configuration. Final assembly is planned inside the United States.	We are including in the final rule a cross reference in §91.707 to 40 CFR 1068.330, which was designed for this situation.
91.119: Southwest Research Institute and EMA requested clarification that updating the test-procedure references from part 86 to part 1065 aren't intended to require lab upgrades.	The references introduced in part 89 are intended only to facilitate the migration of specified test procedures for heavy-duty highway engines from part 86, subpart N, to part 1065. Most of these references point to background information or optional systems. There is no intent to require new equipment or revised procedures as a result of these changed references. To ensure that this is the case, we are adding a provision in §91.119 stating that any of the references to part 1065 may be taken from part 86 as a pre-approved alternative procedure.
Mercury and NMMA noted the need to fix typographical problems that caused incorrect arithmetic symbols in equations in 91.316(d)(6), 91.318(b)(11), 91.325(c)(1)(iv), 91.325(c)(2)(iii), and 91.316(d)(6).	We agree with the corrections noted in the comment and have revised the regulations accordingly.
91.325: Mercury and NMMA suggest adding an equation to complete the provision related to water quench, namely, percent H_2O quench = (D1-AR)/D × 100	We agree with the need to add an equation for the water quench check. To do this, we copied the comparable existing provisions from part 89, which apply equally well to marine spark-ignition engines.
Table 2 of Appendix A to subpart E: Mercury and NMMA point out that the regulations specify a mode 4 torque point of 25 percent, and suggest changing this to 25.3 to align with the cycle specified by the International Organization for Standardization (ISO).	We do not object to the recommended change in the duty cycle, but we did not include this in the proposal. Since changing the duty cycle, even modestly, can affect the stringency of the standards and therefore affect whether an engine meets emission standards or not, we believe it is not appropriate to adopt the recommended change at this time. We may include this in the upcoming rulemaking to adopt a new tier of standards for marine spark-ignition engines.
91.207: Mercury and NMMA requested that we clarify the equation for survival function in calculating emission credits, especially for the last digit, which isn't not clearly identified as an exponent.	We agree with the comment and have adopted the following revised form of the equation to reduce the risk of ambiguity in published form: $S(t) = \exp -(0.906 \times t/\mu_{life})^4$

91.113: Mercury and NMMA requested that manufacturers be allowed to omit the model year from the engine label, since boat owners have been confused when the model year of the boat does not match the model year of the engine (due to manufacturing processes and inventories). It is acceptable to include the full engine family name on the label, which includes a code for the model year.	We suggested an alternate approach, in which the manufacturer would include the engine's manufacture date instead of the model year. Manufacturers requested that we defer action on this item, rather than make such a change to the regulations at this time. We are taking no action on this item in the final rule, but expect to revisit the issue in the future.
91.506: Mercury and NMMA suggested that EPA should allow manufacturers to select engine families for in-use testing, with 30 days for EPA to object to the family selection. This concern comes from recent experiences of waiting until late in the model year to know which family to prepare for testing, which made it harder to execute the test plan.	We believe it is important for us to continue selecting engine families for in-use testing. Selecting all the families for in-use testing early in the year is problematic, since it is possible in many cases for manufacturers to produce all the engines in the engine family in much less than a 12-month period. We believe the best approach is to select most of the families early in the model year, reserving a small number of families that can be selected later in the year. Manufacturers are welcome to share their suggestions for selecting families at any time.

Chapter 10: General Compliance Provisions (40 CFR part 1068)

I. Summary and Analysis of Comments

We received several comments on the proposed provisions in 40 CFR part 1068, with additional comments raising new issues for us to consider. All these comments came from the Engine Manufacturers Association, except where otherwise indicated. The following discussion presents a summary and analysis of all these comments. Section II identifies the changes included in the proposal, with a brief rationale for each of those changes.

Issue	Response
1068.30–Definitions: The proposed change to the definition of Exemption should reference Tier 4 and Tier 3 (not Tier 2 and Tier 1).	Since part 1068 applies broadly to different engine categories, we believe it is important to make the language as general as possible. We are therefore changing the definition to address the situation for an exemption from a Tier 3 standard, which may require the manufacturer to meet less stringent Tier 1 or Tier 2 standards as a condition of the exemption.
1068.30–Definitions: The definition for Motor vehicle should recite the full definition or simply refer to part 85, rather than summarizing content.	We agree with the comment and have changed the regulations accordingly.
1068.240–Replacement engines: Change label language to more clearly specify the year of applicable standards. The label should state the first applicability date for the standards for which the exemption applies, and the first applicability date for the standards that were in effect for the replaced engine.	We agree with the comment and have changed the regulations accordingly.
1068.245 and 1068.250–Hardship: An engine meeting alternate standards should have a label saying the engine is exempt, not “meets requirements under 1068.245 or 1068.250.”	Industry comments from previous rulemakings have led us to differentiate engines exempted with a requirement to meet less stringent standards from those that remain uncontrolled. For marketing reasons and for EPA compliance efforts, it is important to identify an engine as meeting applicable requirements, if alternate standards apply. The proposed §1068.265 included label language that would conflict with the proposed labeling changes in §1068.245 and §1068.250. We have changed the hardship provisions to allow EPA to specify label language appropriate for such engines.

1068.260–Delegated assembly: The current requirements allowing separate shipment of aftertreatment components should be set up to waive auditing requirements for manufacturers that include the price of the aftertreatment in the cost of the engine for the equipment manufacturer. If the component cost is already covered, the equipment manufacturer has enough incentive to make the final installation without additional oversight. The cost of shipping should not be counted as part of the cost of the component. Also, the temporary label shipping as part of the aftertreatment cost. The temporary label adds an unnecessary burden that provides no added value. The commenter also requested clarification regarding the method for auditing an equipment manufacturer if the engine manufacturer also makes the equipment.	We continue to believe the provisions adopted in §1068.260 are appropriate for nonroad engines. The more extensive oversight and control mechanisms are important to ensuring that engines are assembled correctly, since there are so many possible equipment manufacturers and so many different business relationships among companies. Given that we are requiring engine manufacturers to include the cost of aftertreatment components in the price of the engine, we believe it is implicitly clear that the engine manufacturer is responsible for shipping costs, so we have removed the proposal to restate that in the regulations. We are making two other adjustments to the proposal: -We are removing the requirement for engine manufacturers to arrange for *direct* shipment of aftertreatment components from the supplier to the equipment manufacturer, since a third party may appropriately be involved to produce system assemblies for integration into equipment. -We are adding a paragraph to clarify that integrated manufacturers can meet their auditing requirements by maintaining a database for matching up engiens with the appropriate aftertreatment components.
1068.260–Caterpillar commented that we should allow them to complete their engine assembly at different facilities, including some steps performed by another company under contract.	We have added a new provision allowing manufacturers to assemble engines in different locations, provided that they maintain control of the engines at all times, and inform us that they are using this exemption. We may require that manufacturers take certain steps to ensure that engines end up in their certified configuration. We have also modified the labeling requirements in 1068.201(c) to allow for more flexible approaches to labeling exempted engines.
1068.265–Conditional exemptions: EMA requested that we clarify the requirement to use an alternative to the engine-family name on the label. The labeling requirements should also be coordinated with the label language under the applicable exemption provisions.	We have modified the label language to more clearly describe the way manufacturers must identify the engines. The full engine family name would be inappropriate, since the engines are not certified and therefore do not have an engine-family identification. At the same time, all the engine-family identifiers apply except for the model year, so we have revised the regulations to require the label to identify the engine by the otherwise applicable engine-family code except for the digit related to model year.
1068.325–Repair exemption: EMA recommended changing the exemption allowing an owner to import a nonroad engine solely for the purpose of repair or alteration to align with the similar provisions for locomotive and marine diesel engines. This would generally allow engine operation as needed for transportation to facilitate repairs.	This change is already incorporated into the regulatory provisions of 1068.325. No further change is needed.

In addition to these comments, we have identified a variety of additional minor changes and adjustments to include in the final rule, such as changes to correct organizational and nomenclature errors. In addition, these changes include:

- Revising §1068.305 to change the phone number related to the importation form.

- Revising §1068.315 to add a reference to the new exemption for delegated assembly, include a specific reference to the hardship provisions in §1068.250, and renumber the surrounding paragraphs accordingly.
- Revising §1068.325 to remove the general requirement to get EPA approval for engines that are imported under a temporary exemption. The provisions or individual exemptions may require EPA approval, but our longstanding policy for most temporary exemptions is to rely on the bonding requirement to ensure compliance, rather than a specific approval step.
- Revising §1068.330 to include an exemption for importing complete engines that will be installed in an application subject to equipment-based standards. This was intended under the original regulations, but this is unclear due to the different situation for products subject to engine-based and equipment-based standards. We are also defining "equipment" in §1068.30 to further clarify these provisions. Also, we have made a change to remove the bonding requirement for certificate holders importing partially complete engines. Since we have an established compliance relationship with these companies, we believe it would be unnecessarily burdensome to require them to maintain a bond for their ongoing production processes.
- Revising §1068.335 to clarify that the temporary exemptions in both §1068.325 and §1068.330 are covered by the applicable penalty language. This is intended primarily to clarify that the exemption for partially complete engines is treated as one of the temporary exemptions, even though it is not listed with the usual set of temporary exemptions for importing noncompliant products.
- Clarifying the reporting responsibilities under the separate-shipment provisions of §1068.260. The original regulation was unclear about deadlines whether there was a problem to report or not. We are revising the language consistent with the most appropriate interpretation, that the specified 90-day reporting requirement in §1068.260(a)(6)(ii) applies to audit reports where there is no problem. The existing requirement to report problems after 15 days in §1068.260(d) is independent of this routine reporting responsibility.

II. Summary of Rulemaking Changes

We are making various changes to the general compliance provisions in 40 CFR part 1068, which currently applies to land-based nonroad diesel engines, recreational vehicles, and nonroad spark-ignition engines over 19 kW. We encourage manufacturers of other engines to take note of these changes, since we intend eventually to apply the provisions of part 1068 to all engines subject to EPA emission standards. The following changes in part 1068 were in the proposed rulemaking, with any appropriate adjustments as noted above.

- §1068.10: Clarify confidentiality provisions to address how we treat information that we collect from on-site visits or testing, as opposed to information that manufacturers send to us.
- §1068.30: Add or correct definitions to coordinate with the standard-setting parts and clarify various terms.
- §1068.105: Expand paragraph (a) to better explain requirements for equipment manufacturers to use current model-year engines. This relates especially to the existing provision that allows equipment manufacturers to use up their normal inventories of engines from previous model

years in cases where a new emission standard takes effect. We are changing §1068.101(a)(1) to reflect these changes.

- §1068.110: Clarify that the manufacturers' warranty obligation includes all expenses related to diagnosing and repairing or replacing emission-related parts. This is not intended to include incidental expenses (such as replacement units during warranty service), consequential damage (such as damage caused by engine malfunction), or opportunity costs (such as foregone revenue from engine downtime).
- §1068.115: Add text to paragraph (a) to provide a complete list of reasons for manufacturers to deny warranty claims. This clarifies that the list of reasons given in paragraph (b) is descriptive, and is not intended to be comprehensive.
- §1068.245: Clarify that manufacturers applying for hardship must use the provisions of §1068.250 (if applicable) before applying for hardship under §1068.245. This is necessary to remove the ambiguity resulting from the current approach, which specifies that both §§1064.245 and 1068.250 are provisions of last resort.
- §1068.265: Add provisions that clarify what manufacturers must do when they are required to meet emission standards for engines that are not certified. A typical example would be an exemption that applies to new engines that replace an old engine that was certified to emission standards. We already require these engines to have the same degree of emission control as the replaced engine. We do not want manufacturers to certify these engines, but we are adding requirements to clarify how manufacturers can show that the new engines meet an older set of emission standards. This involves either using an engine that is the same as one that was certified in an earlier model year, or performing tests to show that the engines meet the specified emission levels. In any case, manufacturers need not go through the process or pay the fees associated with certification. We recently adopted these same provisions for nonroad diesel engines and are extending them to the other engine categories covered by part 1068.
- §1068.315: Reduce the ownership requirement for the identical configuration exemption from one year to six months; also, change the qualifying criterion from "the same as" to "identical to."
- §1068.410: Add provisions allowing manufacturers to test engines up to three times total if an engine family reaches a fail decision under selective enforcement auditing, consistent with the provisions that apply under most of our programs.
- §1068.510: Clarify that manufacturers must describe the qualifications of repair personnel, rather than simply stating that they are qualified.